

RESTRICTED  
FOR OFFICIAL USE ONLY

AN 03-5DA-14  
A.P. 2156A

*HANDBOOK OF INSTRUCTIONS  
WITH PARTS CATALOG*

TYPE SF9LN-4  
AIRCRAFT MAGNETOS

SCINTILLA

**NOTE:** This Handbook replaces all information regarding the SF9LN-4 magneto contained in T. O. No. 03-5DA-2 dated October 10, 1942, T. O. No. 03-5DA-3 dated September 25, 1942, and T. O. No. 03-5DA-4 dated November 20, 1942.

*NOTICE: This document contains information affecting the national defense of the United States within the meaning of the Espionage Act, 50 U. S. C., 31 and 32, as amended. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.*

APRIL 15, 1944

Published under joint authority of the Commanding General, Army Air Forces, the Chief of the Bureau of Aeronautics, and the Air Council of the United Kingdom.

**THIS PUBLICATION MAY BE USED BY PERSONNEL RENDERING SERVICE TO THE UNITED STATES OR ITS ALLIES**

**Instructions Applicable to AAF Personnel.**

Paragraph 5.d. of Army Regulation 380-5 relative to the handling of restricted printed matter is quoted below:

"d. Dissemination of restricted matter.—The information contained in restricted documents and the essential characteristics of restricted material may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies."

**Instructions Applicable to Navy Personnel.**

Navy Regulations, Article 75½, contains the following paragraphs relating to the handling of restricted matter:

"(b) Restricted matter may be disclosed to persons of discretion in the Government service when it appears to be in the public interest.

"(c) Restricted matter may be disclosed, under special circumstances, to persons not in the Government service when it appears to be in the public interest."

The Bureau of Aeronautics Circular Letter No. 12-43 further states:

"Therefore, it is requested that all naval activities check their own local regulations and procedures to make sure that handbooks, service instructions and other restricted technical publications are actually being made available to both civilian and enlisted personnel who have use for them."

**General.**

These instructions permit the issue of restricted publications to civilian contract and other accredited schools engaged in training personnel for Government work, to civilian concerns contracting for overhaul and repair of aircraft or aircraft accessories, and to similar commercial organizations.

**LIST OF REVISED PAGES ISSUED**

NOTE: A heavy black vertical line, to the left of the text on revised pages, indicates the extent of the revision. This line is omitted where more than 50 percent of the page is revised.

**ADDITIONAL COPIES OF THIS PUBLICATION MAY BE OBTAINED AS FOLLOWS:**

**AAF ACTIVITIES.**—Submit requisitions to the Commanding General, Fairfield Air Service Command, Patterson Field, Fairfield, Ohio, Attention: Publications Distribution Branch, in accordance with AAF Regulation No. 5-9. Also, for details of Technical Order distribution, see T. O. No. 00-25-3.

**NAVY ACTIVITIES.**—Submit requests to the Chief, Bureau of Aeronautics, Navy Department, Washington, D. C. Also, see NavAer 00-500 for details on distribution of technical publications.

**BRITISH ACTIVITIES.**—Submit requirements on Form 294A, in duplicate, to the Air Publications and Forms Store, New College, Leadhall Lane, Harrogate, Yorkshire, England.

TABLE OF CONTENTS

SECTION	PAGE
I Introduction.....	1
II Description.....	1
1. General Description.....	1
2. Detailed Description.....	1
III Installation.....	3
1. General.....	3
2. Timing to Engine.....	3
3. Wiring.....	4
IV Operation.....	5
1. Principles of Operation.....	5
2. Operation of Ground.....	5
V Service Inspection, Maintenance, and Lubrication.....	7
1. Service Tools Required.....	7
2. Service Inspection.....	7
3. Maintenance.....	7
4. Lubrication.....	7
5. Service Troubles and Remedies.....	8
VI Disassembly, Inspection, Repair, and Reassembly.....	10
1. Overhaul Tools Required.....	10
2. Disassembly.....	11
3. Inspection and Repair.....	13
4. Reassembly.....	14
5. Special Instructions for Inscribing Timing Marks on a New Adaptor or Drilling Vent Holes in An Adaptor.....	19
6. Cleaning and Treatment of Dielectric Parts.....	20
VII Magneto Test Procedure.....	21
1. Mounting Magneto on Test Stand.....	21
2. Coming-in Speed Test.....	21
3. Running Test.....	21
4. Booster Test.....	21
5. Rotating Magnet.....	21
6. Coil.....	21
7. Primary Condenser.....	22
8. Leather Plugs over Screws in Front End Plate.....	22

PARTS CATALOG

SECTION	PAGE
I Introduction.....	23
II Group Assembly Parts List.....	24
III Numerical Parts List.....	33
IV Standard Parts List.....	34



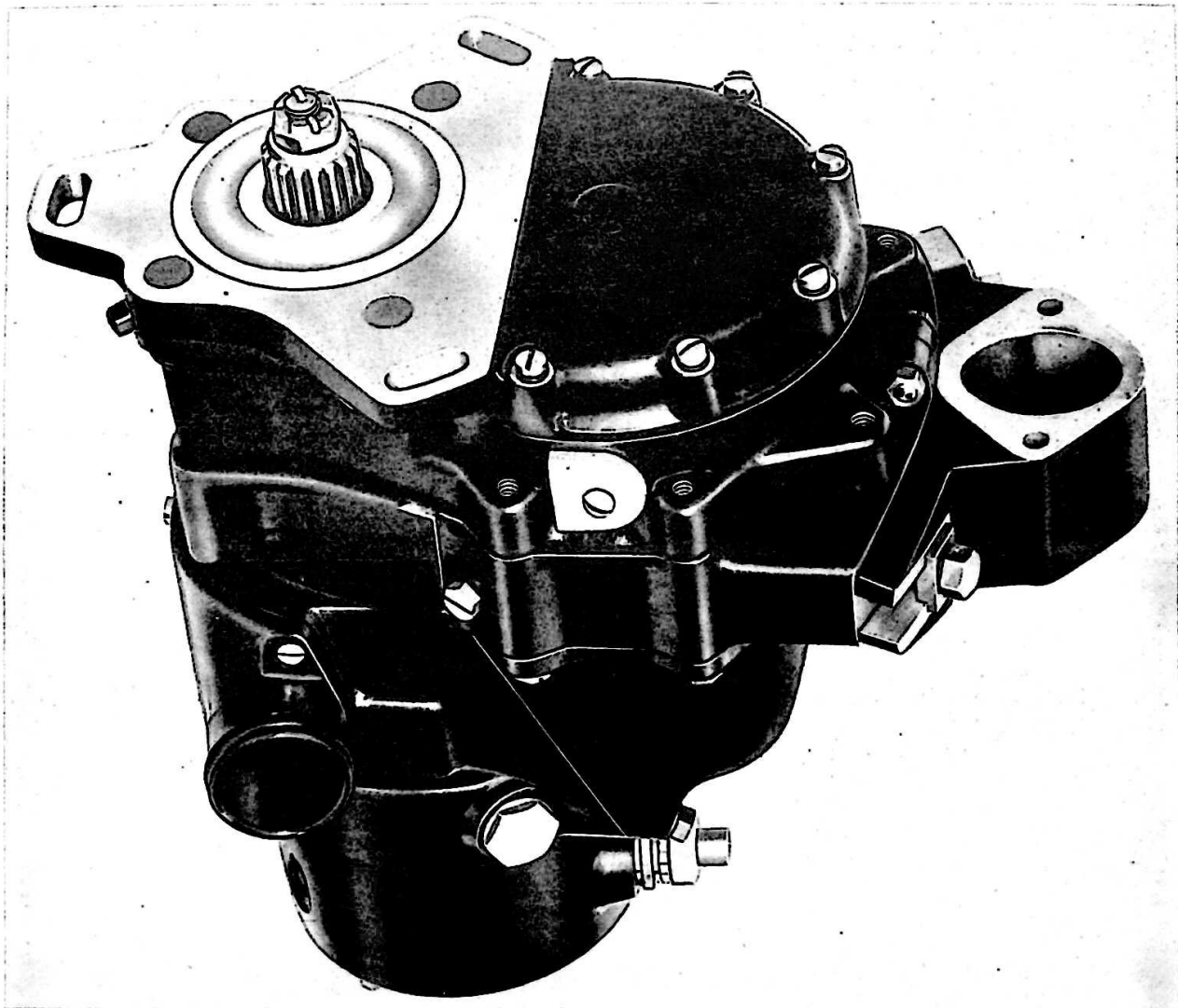


Figure 1 - Type SF9LN-4 Magneto.



SECTION I  
INTRODUCTION

1. This Handbook is issued as the basic technical instructions for the equipment involved.
2. This Handbook contains service and overhaul instructions with parts catalog, for the SF9LN-4 magneto, manufactured by Scintilla Magneto Division of the Bendix Aviation Corporation, Sidney, New York on Contracts W 535-ac-27345, and W 535-ac-33183.
3. The type designations of aircraft magnetos are set up according to A and N specifications. The following detailed explanation of the meaning of the various letters and numbers appearing in a type of designation is given so that the subject type magnetos can be more readily identified.
  - a. "S" indicates single type ignition unit.
  - b. "F" indicates flange mounting.
  - c. Numbers (such as 9) indicate number of cylinders served.
  - d. "L" indicates left hand (anticlockwise) rotation as viewed from the drive end of the magneto.
  - e. "N" indicates Scintilla manufacture. (This letter was assigned by the U.S. Government.)
  - f. A dash and number (such as -4) indicates a certain execution or modification of a basic type magneto. Example the SF9LN-4 magneto is a single, flange mounted, 9 cylinder, left hand (anticlockwise) rotation magneto, manufactured by Scintilla.

SECTION II  
DESCRIPTION

1. GENERAL DESCRIPTION.

a. The SF9LN-4 magneto is a single, flange mounted, nine cylinder magneto of anticlockwise rotation. It is driven at 1-1/8 engine crankshaft speed.

b. The unit is designed and manufactured for use on a nine cylinder radial engine, and can be used on either the right or left hand side of the engine by adjusting the outlet for the radio shield and using the air blast cover for the particular side.

2. DETAILED DESCRIPTION. (SEE FIGURE 2.)

a. ROTATING MAGNET. - The four pole rotating magnet used is made of a high grade magnet steel which enables a stable magnetic field to be maintained, producing adequate energy output for long periods of time. The magnet turns on two annular ball bearings, one located at the breaker end and the other at the drive end. These bearings are packed

with a high temperature grease and do not require lubrication between overhaul periods.

b. BREAKER CAM.

(1) The breaker cam has nine lobes and is driven at 1/2 engine crankshaft speed by means of reduction gears at the breaker end. The cam is secured to a cam shaft which rotates on two single row ball bearings located in the adaptor assembly. The large cam gear is secured to the other end of the cam shaft and is turned by means of a somewhat smaller gear on the rotating magnet shaft. The gear ratio between these two cam gears is 4:9. The cam speed in relation to the engine crankshaft is  $9/8 \times 4/9$  or 1/2 engine crankshaft speed.

(2) The cam lobes are ground at unequal intervals to compensate for the slight characteristic top dead center variations of each piston on radial type engines. The unequal intervals between the cam lobes result in having the contact points open at the exact

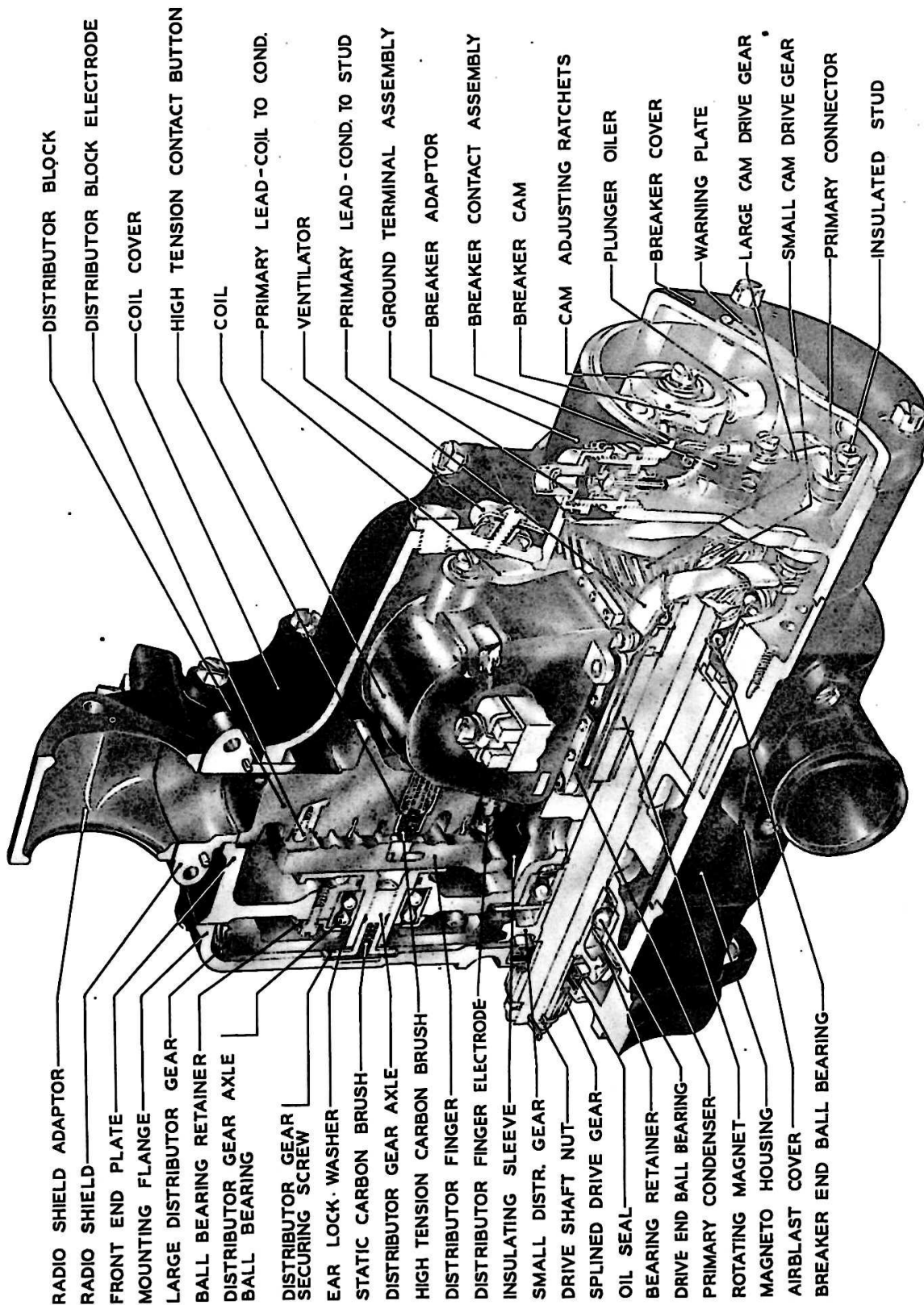


Figure 2 - Three Quarter Cutaway  
View of SF9LN-4 Magneto.

predetermined full advance firing position of the pistons. On the magneto, however, the "E" gap varies for each contact point opening. The cam lobe which opens the contact points for firing No. 1 cylinder is indicated with a timing mark.

#### NOTE

The "E" gap is the number of degrees the rotating magnet has passed its neutral position when the contact points begin to open.

c. ADAPTOR. - The adaptor enclosing the cam reduction gears is provided with elongated slots for adjustment of the backlash of the cam gears. The contact point assembly is secured directly to the adaptor. A breaker plate is not used and, therefore, the magneto can be used only for fixed spark requirements.

d. COIL. - The primary and secondary windings of the coil are sealed in a hard rubber

case. This protects the coil chiefly from the effects of moisture.

#### e. DISTRIBUTOR.

(1) The ratio between the large distributor gear and the small distributor gear is also 4:9 and consequently the distributor finger turns also at 1/2 engine crankshaft speed.

(2) The small distributor gear located on the drive shaft extension drives the large distributor gear and distributor finger. The ratio between these two gears is such that the high tension current from the coil is conducted to the distributor block electrodes and thence through the high tension cables to the spark plugs at the correct firing interval of the engine. The high tension current is conducted from the coil through the medium of a carbon brush, to the distributor finger. High temperature grease is applied to the distributor gears and further lubrication is not necessary except at overhaul periods.

### SECTION III

#### INSTALLATION

##### 1. GENERAL.

Before installing a magneto to an engine, always make sure that it has been properly checked and inspected. Also make sure that the engine type designation and master rod location engraved on the cam, corresponds to the engine on which the magneto is to be installed.

##### 2. TIMING TO ENGINE.

a. NO. 1 FIRING POSITION OF ENGINE. - Turn the engine crankshaft in the direction of normal rotation, to the full advance number one cylinder firing position on the compression stroke, in accordance with the engine manufacturer's instructions.

b. NO. 1 FIRING POSITION OF MAGNETO. - Remove the main cover, breaker cover, and distributor block. Turn the magneto drive shaft until the timing mark (A) (figure 3) on the distributor finger is approximately opposite the timing mark (B) on the inside of the front end plate when a straight edge (K) placed on the step cut in the cam coincides with the timing marks (M) and (N) at the end of the breaker adaptor. At this position, the high tension electrode (D) on the distributor finger will be opposite the distributor block electrode (E) for firing the No. 1 cylinder. Install the magneto to the engine in the foregoing relation but do not tighten the cap screws or nuts to the extent that further adjustment cannot be made.

##### c. TIMING.

(1) When the exact timing is to be made, all adjustments must be made at the drive end and NOT BY ALTERING THE ADJUSTMENT OF THE CONTACT POINTS.

(2) Make final timing adjustments by turning magneto through the angle provided by the slots in the mounting flange so that the contact points just begin to open when a straight edge (K) placed on the step of the cam coincides with the timing marks (M) and (N) on the breaker adaptor (figure 3). It may be found that timing mark (A) on the distributor finger is not exactly opposite the timing mark (B) on the inside of the front end plate after making the final adjustment by having the straight edge (K) on the cam coinciding with the timing marks (M) and (N). However, a slight variance of the distributor finger timing mark (A) will not affect the operation of the magneto as this is merely used to locate the approximate firing position of the magneto for No. 1 cylinder.

d. SYNCHRONIZED SPARK REQUIREMENTS. - The breaker contacts of both magnetos must open at the same instant within close limits. Use the Abbott A-100 timing light or the equivalent to determine the opening of the contacts. The use of shim stock or cellophane feeler strips invariably introduces a possibility of fouling the points, since oil and dirt are nearly always present on such feeler strips. If the strip is of soft material such as cellophane,



brass, or foil, particles of the strip itself are likely to remain between the contacts, causing unsatisfactory magneto operation. Therefore, avoid the use of feeler strips between the contact points. When the synchronization has been made, secure the magnetos firmly by tightening all the cap screws or nuts.

e. STAGGERED SPARK REQUIREMENTS. - One magneto will fire later than the other. Install and time one magneto in the same manner as explained for synchronized sparks. Then turn the engine crankshaft until the piston

tributor cable hole marked No. 2, etc. The numerals on the distributor block denote the serial firing order of the magneto and have no bearing whatsoever on the engine firing sequence. It is recommended that the parts of the cables which are inserted in the distributor block cable holes be treated with powdered talc to prevent their fusing to the walls of the distributor block cable holes. Connect the cable from the booster source to the distributor block cable hole marked "B", and secure it with a cable piercing screw. A lock washer is not required beneath the head of this piercing screw. In the magneto

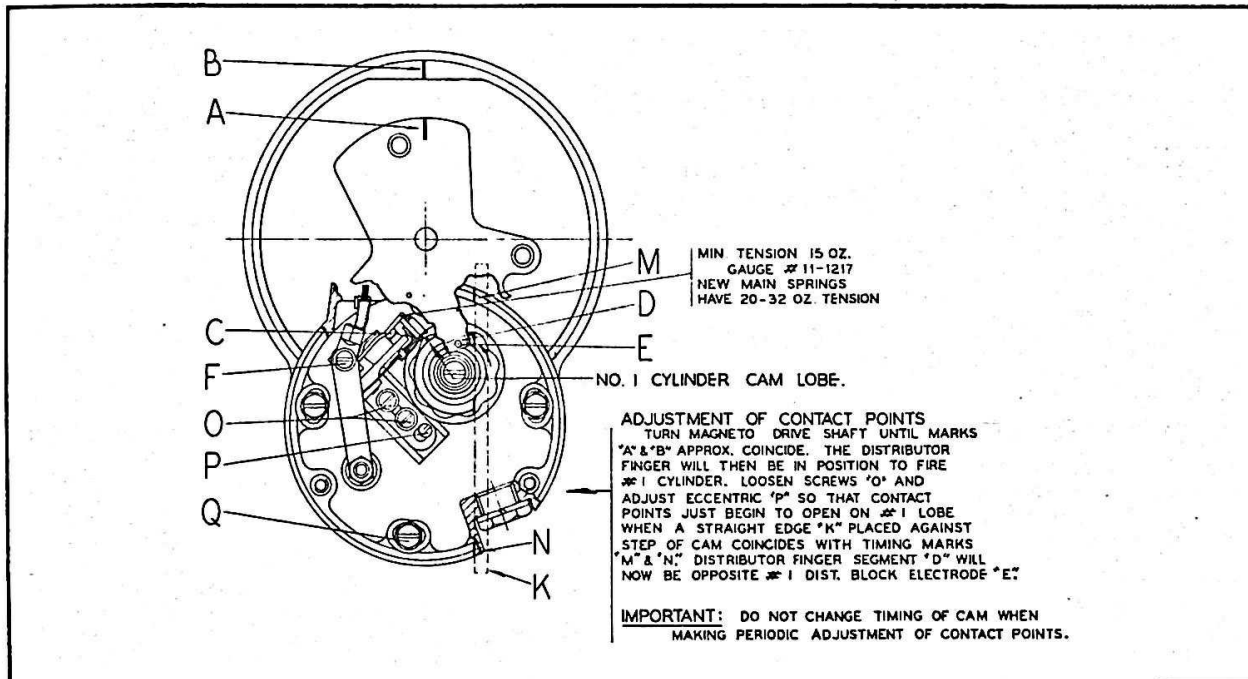


Figure 3 - Magneto Timing.

of No. 1 cylinder is in the correct position for the staggered spark requirements and install the other magneto in the same manner followed for the first magneto.

### 3. WIRING.

#### a. HIGH TENSION CABLE CONNECTIONS.

(1) Remove the cable piercing screws from the distributor blocks to avoid any possibility of the high tension cables not being fully seated in the base of the cable holes.

(2) Insert the spark plug cable for No. 1 cylinder into the distributor block cable hole marked No. 1 and secure it with the cable piercing screw. Insure that the piercing screw is tight. Place the spark plug cable for the next cylinder to fire into the dis-

tributor cable hole marked No. 2, etc. The numerals on the distributor block denote the serial firing order of the magneto and have no bearing whatsoever on the engine firing sequence. It is recommended that the parts of the cables which are inserted in the distributor block cable holes be treated with powdered talc to prevent their fusing to the walls of the distributor block cable holes. Connect the cable from the booster source to the distributor block cable hole marked "B", and secure it with a cable piercing screw. A lock washer is not required beneath the head of this piercing screw. In the magneto

b. TESTING HIGH TENSION CABLE CONNECTIONS. - Before installing the radio shields, it is recommended that the connections be checked for any short or open circuit and to ascertain whether or not the cables lead to the proper cylinders, from the magneto. Either a buzzer or light system, or a booster magneto can be used. When using a buzzer or light system, touch the distributor block electrode with one point and the spark plug end of the cable for the proper cylinder with the other. The circuit is complete when the buzzer gives a signal or the lamp lights. If the circuit is not complete, check for a possible open circuit or wrong connection of the cable. To check for

a short circuit due to faulty insulation of the cable, a booster magneto is used. The high tension terminal of the booster magneto is connected to the distributor block electrode. The spark plug end of the cable is held about 1/4 inch from a grounded object. If no spark occurs, check the cable for faulty insulation.

c. **RADIO SHIELD.** - Install the radio shield to the distributor block. Allow enough slack in the cables to prevent extreme sharp bends. Install the radio shield, distributor block, and main cover on the magneto.

d. **GROUND WIRE.** - Unscrew the ground terminal cap and take out the brass contact, rubber washer, and ground wire shielding ferrule. (See figure 4.) Slip ferrule through the terminal cap and solder ground wire shielding to it. Strip the insulation from the end of the wire for a length of 3/16 inch. Insert wire through rubber washer and into the brass contact. Slide the rubber washer back over the ground wire to avoid the heat, and then solder the stripped end of the wire to the

brass contact. File solder flush with contact surface, take up slack in the wire, and screw the cap home, locking it with wire bail.

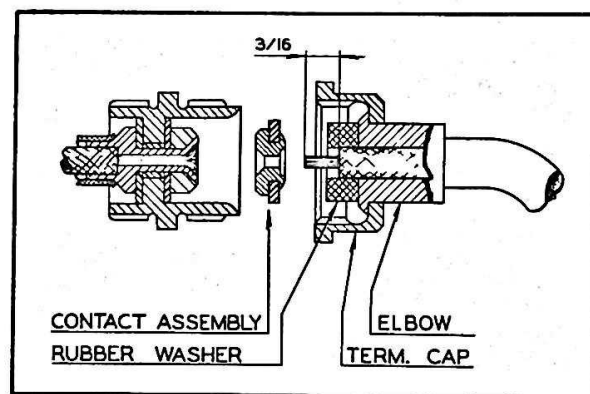


Figure 4 - Ground Wire Connections.

## SECTION IV

### OPERATION

#### 1. PRINCIPLES OF OPERATION.

a. The poles of the rotating magnet are arranged in alternate polarity, (figure 5) so that the flux can pass from a north pole through the coil core and back to a south pole. As the magnet is turned, the polarity continually changes thereby producing flux reversals in the coil core. The number of flux reversals during one complete revolution of the magnet is equal to the number of poles on the magnet.

b. The flux reversals induce current in the primary winding when the contact points close. The flow of current in the primary winding stores energy which is released later by the opening of the contact points thereby producing high voltage in the secondary winding.

c. One end of the primary winding is connected to ground. The other end is connected to the insulated contact point. When the contact points are closed, the primary current passes to ground. The condenser is connected across the contact points.

d. One end of the secondary winding is connected to the insulated end of the primary

winding. The other end terminates at the high tension insert on the coil. High tension current in the secondary winding is then conducted to the central insert of the distributor finger by means of a carbon brush. From here it is conducted to the high tension electrode on the distributor finger and across a small air gap to the electrodes of the distributor block. High tension cables then carry it to the spark plugs where the discharge or spark occurs for ignition purposes.

e. The booster segment is located so that it trails the high tension electrode on the distributor finger to give a retarded spark for starting the engine.

#### 2. OPERATION OF GROUND.

The ground terminal on the magneto is electrically connected to the insulated contact point. A wire is connected between the ground terminal and the switch. When the switch is in the "OFF" position, this wire provides a direct path to ground for the primary current before it passes through the contact points. This prevents the primary current from being interrupted when the contact points open and therefore high voltage is not produced in the secondary winding.



- |    |                                   |    |                                       |    |   |
|----|-----------------------------------|----|---------------------------------------|----|---|
| 1  | DISTRIBUTOR BLOCK ELECTRODE       | 12 | INSERT - BOOSTER CURRENT              | 23 | CAM GEAR - SMALL                            |
| 2  | DISTR FINGER HIGH TENSION SEGMENT | 13 | SECONDARY WINDING                     | 24 | ROTATING MAGNET                             |
| 3  | HIGH TENSION CONTACT BUTTON       | 14 | PRIMARY WINDING                       | 25 | PRIMARY CONDENSER                           |
| 4  | CARBON BRUSH                      | 15 | COIL CORE                             | 26 | PRIMARY CONNECTOR -                         |
| 5  | DISTRIBUTOR GEAR AXLE             | 16 | POLE SHOE EXTENSIONS                  |    | CONDENSER TO INSULATED POST                 |
| 6  | DISTRIBUTOR FINGER                | 17 | PRIMARY CONNECTOR - COIL TO CONDENSER | 27 | KEEPER - MAGNET POLES                       |
| 7  | BOOSTER SEGMENT                   | 18 | CAM SHAFT                             | 28 | GROUND TERMINAL OUTLET                      |
| 8  | DISTRIBUTOR GEAR - LARGE          | 19 | CONNECTOR - TO CONTACT ASSEMBLY       | 29 | CONNECTOR - CONTACT ASSY TO GROUND TERMINAL |
| 9  | DISTRIBUTOR GEAR - SMALL          | 20 | CAM SHAFT BEARINGS                    | 30 | SUPPORT - CONTACT BREAKER                   |
| 10 | DISTRIBUTOR BLOCK                 | 21 | CAM GEAR - LARGE                      | 31 | SPRING - CONTACT BREAKER - MAIN             |
| 11 | BOOSTER COLLECTOR RING            | 22 | INSULATED POST                        | 32 | CAM FOLLOWER                                |
|    |                                   |    |                                       | 33 | BREAKER CAM                                 |

Figure 5 - Electric Chart.



SECTION V

SERVICE INSPECTION, MAINTENANCE, AND LUBRICATION

1. SERVICE TOOLS REQUIRED.

PART NO.	NAME	APPLICATION
Abbott A-100	Timing Light	To determine the position where contact points open.
11-1248	Contact Point Dressing Kit (Includes Stone No. 11-1269)	For dressing contact point surfaces.

2. SERVICE INSPECTION.

NOTE

In accordance with T.O. No. 00-20A-2, a summary of the periodic inspections prescribed below will be entered in the Master Airplane Maintenance Instruction Forms maintained in the back of the Form 41-B for the airplanes affected.

COLUMN 22 - IGNITION AND ELECTRICAL

Preflight Inspection

For preflight inspection, see the Handbook for the airplane in which the engine is installed.

50-Hour Inspection

Take off magneto cover and inspect breaker assembly.

At regular routine inspection periods, check the adjustment of the contact points.

IMPORTANT

The contact points of the pivotless breakers must always be adjusted to open at the proper position of the cam in relation to the timing marks at the breaker end of the magneto and not for any fixed clearance between the contact points.

To check the adjustment, place a straight edge on the step cut in the cam. Then turn the crankshaft until this straight edge coincides with the timing marks on the breaker adaptor. At this position the contact points should just begin to open on the No. 1 lobe of the cam. A permissible service tolerance of 1/16 inch at the BOTTOM timing mark is allowed, that is, the distance between the straight edge and the timing mark (N) located on the bottom of the adaptor must not exceed 1/16 inch when the contact points open. If it is more than 1/16 inch, adjustment is necessary.

3. MAINTENANCE.

a. If inspection shows that adjustment is necessary, loosen the two screws (O) (figure 3) which fasten the movable contact support to the breaker plate. Adjust the movable contact point by means of the eccentric screw (P) so that the points just begin to open on the No. 1 lobe when the straight edge (K) coincides with the timing marks (M) and (N). Tighten the screws (O) when the setting has been made and recheck the adjustment.

b. Use the Abbott A-100 timing light or equivalent, to determine the position where the contacts open. The use of feeler strips for this purpose when adjusting the contact points may introduce an error of several degrees in the internal timing of the magneto. Placing of feeler strips between the contacts also increases the possibility of fouling the points with foreign material.

c. When inspecting the contact points, do not raise the breaker main spring beyond a point giving 1/16 inch clearance between the contact points. Raising it beyond this point will weaken it, thereby causing unsatisfactory magneto performance.

d. If the contact points are for any reason pitted or burned, do not attempt to use an ordinary file for dressing purposes. To obtain satisfactory results, the contact points must be removed and placed in a suitable block (No. 11-1248) in which they can be smoothed and polished by means of the special file and stone provided for this purpose.

4. LUBRICATION.

a. The ball bearings and all gears contain an adequate amount of grease and do not require lubrication between overhaul periods.

b. Examine the cam follower felt at the regular routine inspection periods to see that it is properly lubricated. If oil appears on its surface when the felt is squeezed with the fingers, do not add oil. However, if it is dry, moisten it with aircraft engine oil, Specification No. AN-VV-O-446a, or equivalent grade. Do not apply too much oil as the excess will

be thrown off during operation and will come between the contact points thereby causing pitting and burning.

c. Always keep the breaker compartment clean and free from excess oil.

d. If the plunger type oiler is used, it is not necessary to remove the breaker cover to insure that the cam follower is being properly lubricated. At 100 hour intervals, simply remove the retaining clip from the oiler and push the plunger once as far as it will go. Then replace clip. This will deposit sufficient oil on the surface of the cam to provide lubrication for the cam follower. This must always be done when the magneto is not operating. Never push in the plunger when the engine or magneto is being operated as too much oil will collect on the cam.

## 5. SERVICE TROUBLES AND REMEDIES.

### a. GENERAL.

(1) It should be borne in mind that ignition troubles frequently originate in the spark plugs or the ignition harness. Magnetos which are practically new or that have been overhauled at an overhaul base should run for many service hours without trouble. These magnetos should not be tampered with unless it is absolutely necessary. In most cases the cleaning, inspection, and adjustment as outlined in paragraph 2 and 3 a., of this section will suffice.

(2) If no obvious faults are found in the magneto when inspected as above, it is recommended to check the spark plugs and ignition harness wiring first, before dismantling any parts of the magneto for test. If trouble persists after a check has revealed that other

ignition system components are in satisfactory condition the trouble is probably in the magneto.

(3) In general, the most satisfactory correction for troubles known to originate in the magneto is to install another magneto which is in good operating condition, and to turn the defective unit over to the overhaul shop for repair by personnel trained in this work. This recommendation is made because random adjustments and alterations by inexperienced personnel may do more harm than good. Under some circumstances however, it may be impossible to follow this recommendation, and in such cases the following chart may be used as a guide in locating and correcting troubles in the magneto.

### b. TO LOCATE TROUBLE BY PROCESS OF ELIMINATION.

(1) If inspection and adjustment fails to locate the fault, the application of a test may locate the trouble. By a process of elimination one can usually determine what is wrong. If serviceable parts are available, we suggest changing one unit at a time until the trouble has been located. The coil or primary condenser can be changed without removing the magneto from the engine.

(2) Should it become necessary to remove a magneto from the engine because of magneto trouble before the regular overhaul period, consideration should be given the amount of service the magneto has had since its last overhaul. If the magneto has had a large number of service hours, it should be overhauled at this time. However, if the magneto has had a small amount of service, it should only be necessary to locate and remedy the present trouble.

c. TROUBLE	PROBABLE CAUSE	REMEDY
(1) Engine Fails to Start.	(a) Moisture condensation in magneto distributor.	(a) Thoroughly dry the dielectric surfaces of the distributor and coat with oil.
	(b) Condensation in spark plug wells or firing chambers.	(b) Refer to engine handbook of service instructions.
	(c) Moisture in ignition harness or leads.	(c) Refer to engine handbook of service instructions.
	(d) Booster system defective.	(d) Refer to engine or airplane handbook.
	(e) Dead magneto.	(e) Refer to (3) below.
(2) Engine is Rough, Operates Erratically.	(a) Moisture condensation in magneto distributor.	(a) Thoroughly dry the dielectric surfaces of the distributor and coat with oil.
	(b) Condensation in spark plug wells or firing chambers.	(b) Refer to engine handbook of service instructions.

TROUBLE	PROBABLE CAUSE	REMEDY
	(c) Magnetos improperly timed to engine.	(c) Set engine at full advance No. 1 firing position and check for alignment of magneto cam step with timing mark. If out of alignment, refer to section on Installation for correct procedure.
	(d) Magneto compensated cam does not correspond to the engine.	(d) Check cam engraving against engine name plate. If incorrect replace magneto.
	(e) Magneto out of time internally.	(e) Check adjustment of contact points. Refer to paragraph 3 of this section.
	(f) Defective primary condenser.	(f) Remove and test primary condenser. Refer to Section VII, paragraph 7, for procedure.
	(g) Moisture in magneto.	(g) Dry all dielectric parts of magneto and wipe with an oily cloth.
	(h) Dielectric failure.	(h) Check distributor finger, distributor block, and coil housing for carbon tracks or burning. Replace parts if necessary.
(3) Dead Magneto.	(a) Contact points fouled with oil or foreign particles.	(a) Replace contact point assembly or carefully clean point surfaces.
	(b) Defective primary condenser.	(b) Test condenser as instructed in Section VII, paragraph 7. Replace if defective.
	(c) Shorted primary circuit.	(c) Inspect primary connectors for defective insulation. Inspect ground wires and switch for defects.
	(d) Magneto improperly assembled.	(d) Inspect for correct assembly of primary connector and condenser insulating washers.
	(e) Defective Coil.	(e) Remove and test. Refer to Section VII, paragraph 6.



SECTION VI

DISASSEMBLY, INSPECTION, REPAIR, AND REASSEMBLY

1. OVERHAUL TOOLS REQUIRED.

a. The order of procedure given in this section is recommended to prevent any possibility of damage when overhauling the magneto.

b. The following list of tools are required in connection with the work prescribed in this section.

Present Tool No.	Former Tool No.	Tool Name	Application
11-700	4-17011	Magneto Test Stand	For running test of magneto.
11-708	4-16103	Drive Assembly	For mounting magneto on test stand.
Abbott	A-100	Timing Light	To determine the position where the contact points open.
11-958	None	Socket Wrench	For distributor finger high tension electrode.
11-986	4-168	Socket Wrench	For drive shaft nut.
11-989	4-181	Socket Wrench	For distributor block electrodes.
11-1005	4-224	Screw Driver Set (4)	For general use.
11-1032	4-229	Pressing Tool	For pressing in cam shaft bearings.
11-1072	4-1337	Socket Wrench	For general use.
11-1124	4-4676Z	Ammeter	To check primary current.
11-1200	4-9446	Drift	To remove distributor gear axle.
11-1203	4-9449	Sleeve	To support magnet when engaging it with front end plate.
11-1204	4-9453	Drift	To remove distributor gear axle ball bearing.
11-1206	4-9455	Adaptor	To hold distributor block when machining electrodes.
11-1221	4-9886	Indicator	To check gear backlash and cam eccentricity.
11-1230	4-11177	Gage	To check height of distributor finger electrode.
11-1231	4-11178	Gage	To check No. 1 position of distributor finger electrode.
11-1239	4-11781	Box Wrench	To hold 17-tooth drive coupling.
11-1241	4-11824	Drift	To remove drive shaft ball bearing.
11-1242	4-11829	Pressing Tool	For assembling magnet to front end plate and housing.
11-1243	4-11830	Pressing Tool	To press distributor bearing into front end plate.
11-1248	4-12176	Contact Point Dressing Kit (Includes Stone No. 11-1269)	For dressing contact point surfaces.
11-1257	4-12251	Puller	To remove small distributor gear and splined drive coupling.
11-1260	4-12283	Socket Wrench	For large distributor gear securing screw.
11-1269	4-12868	Stone	For replacement of stone furnished with No. 11-1248 tool.
11-1274	4-12933Y	Ohmmeter	To check coil secondary resistance.
11-1275	4-12967	Assembly Tool	To assemble component parts of the contact assembly.
*11-1301	4-14215	Magnet Charger	To magnetize rotating magnet. (110 volt D.C.)
*11-1302	4-14215	Magnet Charger	To magnetize rotating magnet. (36 volt D.C.)
11-1307	4-14325	Tap (3 mm. Loew.)	For cleaning threads of cable piercing screw holes.
11-1309	4-14519	Gear Holder	To hold large distributor gear when tightening or loosening its securing screw.
11-1322	4-14833	Gage	To check height of distributor block electrodes.
11-1335	4-15620	Puller	To remove front end plate from magnet and housing.
11-1344	4-15676	Puller	To remove breaker cam.
11-1350	4-15690	Sleeve	To support magnet when pressing on breaker end bearing.
11-1351	4-15692	Pressing Tool	To press breaker end bearing on magnet shaft.
11-1357	4-15694	Puller	To remove breaker end bearing from magnet shaft.

Present Tool No.	Former Tool No.	Tool Name	Application
11-1368	4-16290	Puller	To remove rotating magnet from housing.
11-1382	4-16919	Pressing Tool	To press drive shaft bearing into front end plate.
11-1401	4-17065	Timing Disc	To set "E" gap and check internal timing.
11-1408	4-17194	Support	To support housing in arbor press.
11-1413	4-17510	Tap	For cleaning threads of distributor block electrode holes.
11-1424	4-17970	Puller	To remove cam shaft front ball bearing.
11-1432	4-18188	Support	To support adaptor when pressing in cam shaft bearing.
11-1444	4-18723	Drift	To remove cam shaft rear ball bearing.
11-1491	4-23466	Pointer	For use with timing disc.
11-1594	4-17618	Cam Setting Tool	For setting cam.
11-1681	None	Tension Wrench	For tightening breaker assembly screw.
11-1735	None	Shaft Holding Wrench	To hold cam shaft.
11-1767	None	Primary Condenser Tester	To check primary condenser.
11-1864	None	Gage	To check breaker main spring tension.
11-1871	None	Gage	To check the height of platinum on contact points.
11-1959	None	Ball Bearing Packer	To repack ball bearings with grease.

\*Order ohager according to voltage source available.

## 2. DISASSEMBLY.

a. COIL COVER AND RADIO SHIELD. - Remove the two screws which secure the coil cover to the housing at the breaker end, and the six screws which secure the coil cover and radio shield to the front end plate. Lift off the coil cover.

b. DISTRIBUTOR BLOCK. - Pull the radio shield assembly squarely back toward the coil to disengage it from the front end plate, and then lift it up and out. Loosen the two screws near the base of the radio shields, which secure the distributor block. Remove the clamping screws which hold the shield halves together and then disengage the shield halves.

### c. COIL AND PRIMARY CONDENSER.

(1) Remove the two screws and clamps which secure the coil to the pole shoe extensions and, also, the two screws which secure the coil directly to the magneto housing. Take out the screw which secures the flexible primary lead to the coil and lift the coil from the magneto housing.

(2) Remove the four screws which secure the condenser to the magneto housing and take out the condenser, insulating plate, bushings, and primary leads.

### d. CONTACT BREAKER, CAM AND ADAPTOR ASSEMBLY.

(1) Remove the breaker cover after taking out the three fastening screws. Remove the plunger oiler.

(2) Take out the screw which fastens the primary connector and ground terminal wire to the contact point assembly.

(3) Remove the contact point assembly after taking out its two securing screws. Lift out the eccentric screw.

(4) Take out cam fastening screw, lock washer, chamfered washer, and the two adjusting ratchets. Pull cam with puller No. 11-1344.

(5) Remove the three screws which secure the adaptor to the housing and lift off adaptor assembly.

(6) Bend back the ear lock washer under the cam shaft gear securing screw and take out screw. Use the No. 11-1735 wrench to hold cam shaft when loosening screw. Place drift No. 11-1200 on the gear end of the cam shaft and tap with a light hammer until the shaft is disengaged from the gear and ball bearings. Remove the cam shaft bearing nearest the gear, using puller No. 11-1424. Pick out the spacer, which will be left as a loose part. Drive out the remaining bearing with the No. 11-1444 drift.

(7) The stud to which the flexible primary leads are attached extends through the adaptor and is insulated from it by means of insulating bushings. The stud and flexible leads can be removed if necessary by taking off the lock nuts and washers.

### e. FRONT END PLATE & MOUNTING FLANGE.

(1) Remove the drive shaft nut. This is done by holding the magneto drive coupling with the box wrench No. 11-1239 and using the No. 11-986 socket wrench for the nut.

(2) Remove the drive coupling. If it sticks, use puller No. 11-1257.

(3) Take out the four screws which hold the mounting flange and front end plate to the magneto housing. Take out the six screws which secure the flange to the front end plate, and tap the flange lightly to remove it from the plate. If the oil seal in the flange shows evidence of failure or deterioration remove it and replace with a new seal. The old oil seal can be pressed out with a small wooden dowel 1-1/8 inch in diameter. The new oil seal can be pressed in using No. 11-1350 support. (See figure 6.)

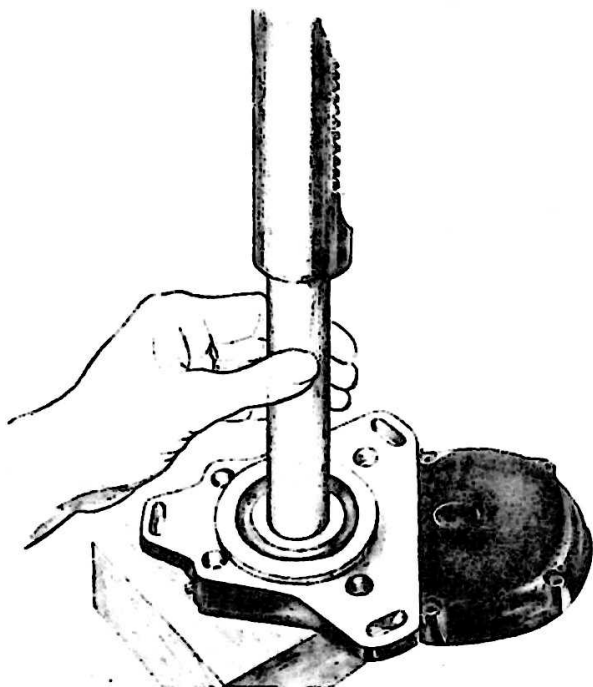


Figure 6 - Removing Oil Seal  
from Mounting Flange.

(4) Remove the small distributor gear with puller No. 11-1257.

(5) Take out the drive shaft ball bearing retainer by removing the three screws which secure it to the front end plate. Place puller No. 11-1335 over the splined shaft and insert its three screws into the tapped holes from which the bearing retainer screws were removed. Tighten the screws firmly with the hand and make sure body of puller is square with magneto housing, backing off one or two of the screws if necessary, to obtain this relation. Turn the handle of the puller until the front end plate is disengaged from the rotating magnet and housing. Then remove puller from front end plate.

(6) Pick out the insulating sleeve, which will be released as a loose part when the housing is disengaged from the front end plate.

Inspect the three rubber plugs which hold the insulating sleeve tight in the housing. If plugs are deteriorated or damaged, replace. To facilitate assembly the plugs may be secured in place with a drop of glue.

#### f. DISTRIBUTOR.

(1) Bend back the four ear lock washer on the distributor gear axle hexagon screw. Remove the carbon brush and take out the screw with socket wrench No. 11-1260 and gear holder No. 11-1309. Place drift No. 11-1200 on the end of the distributor gear axle and tap it with a light hammer until the axle is disengaged from the distributor gear and ball bearing. Remove the Woodruff key from the slot in the distributor gear. Disengage the axle and distributor finger by removing the three securing screws.

(2) Remove the distributor gear axle ball bearing retainer from the front end plate by taking out its securing screws. Drive out the distributor gear axle ball bearing and drive shaft ball bearing, using drifts No. 11-1204 and No. 11-1241, respectively.

#### g. MAGNETO HOUSING AND ROTATING MAGNET.

(1) Puller No. 11-1368 is used to remove the rotating magnet from the housing. Engage the two screws of the puller within the tapped holes in the cam gear housing, backing off the main screw of the puller enough to allow



Figure 7 - Removing Breaker End  
Bearing from Magnet Shaft.



the thumb screws to enter the holes to their full depth. Be sure bar of puller is square with the housing, backing off one screw, if necessary, to obtain this relation. Then turn puller handle to right until rotor is pushed out of housing.

(2) Bend back the ear lock washer under the small cam gear securing screw on the breaker end of the magnet shaft. Remove the screw, ear lock washer, screw retainer, small cam gear and Woodruff key. Remove the breaker end bearing from the magnet shaft with puller No. 11-1357. (See figure 7.)

### 3. INSPECTION AND REPAIR.

#### a. DISTRIBUTOR BLOCK.

(1) Clean the electrode surfaces in the distributor block with a piece of fine emery cloth. If the electrodes are worn badly, replace with new ones. Socket wrench No. 11-989 is used for the electrodes. Also, the No. 11-1413 tap is used for cleaning the tapped holes for the electrodes in the distributor block. Tap No. 11-1307 is used for the tapped holes for the cable piercing screws. Place distributor block in the radio shield assembly and check the height of each electrode with the No. 11-1322 gage. (See figure 8.) It may be found necessary to remove some material from the new electrodes if installed. If so, place the distributor block in the No. 11-1206 adaptor so that it is held securely when machining the electrodes with a suitable cutting tool.



Figure 8 - Checking Heights of Distributor Block Electrodes.

(2) Examine the cable holes and remove any foreign particles which may be in them. Examine all parts of the distributor block to make sure it is not cracked.

(3) Place the point of a screw driver under the head of the contact button. Pad the part of the screw driver which is in contact with the distributor block and pry out the contact button by exerting a light pressure. Remove the springs, sleeve and carbon brush. Inspect carbon brush and springs for excessive wear which might weaken the springs or cause sticking of the carbon brush. See that sleeve is in good condition, and not worn by contact with the springs. After the parts are re-assembled, the contact button should have 3-3/4 to 4-1/4 pounds tension when compressed so that the tip is 5/16 inch from the face of the distributor block. Compress the carbon brush to observe the effectiveness of its spring. The carbon brush and contact button must always move freely. Make sure that either one will come back to its original position under its own spring tension when pressed in with the hand.

#### NOTE

At overhaul periods distributor blocks, coils, condensers, distributor fingers, and other dielectric parts should be thoroughly cleaned, and given a protective coating of wax. Refer to paragraph 6., this section.

b. COIL AND CONDENSER. - Examine the rubber housing of the coil for cracks and make sure all the inserts and screws are tight. For electrical test of the coil and condenser, refer to section VII, paragraphs 6 and 7.

#### c. CONTACT BREAKER ASSEMBLY.

(1) Check the main spring tension with gage No. 11-1864. When making this check make sure that the hook of the gage is applied under the main spring adjacent to the contact point "E" as shown in figure 9. The tension is read at the instant the contact points separate. If the tension of a main spring that has been operated is 15 ounces or more, it is satisfactory for further service. If it is necessary to install a new main spring its tension should be from 20 to 32 ounces. The No. 10-3768 shims are used primarily to line up the contact points squarely to obtain maximum contact surface between the points. The number of No. 10-3768 shims used also affects the main spring tension. Main spring tension is decreased by the addition of No. 10-3768 shims and increased by removal of shims.

(2) Examine the contact points. If the wear seems to be excessive or if the surfaces are rough or pitted, the contact points should be cleaned and polished. To accomplish this, use the contact point dressing kit No. 11-1248.

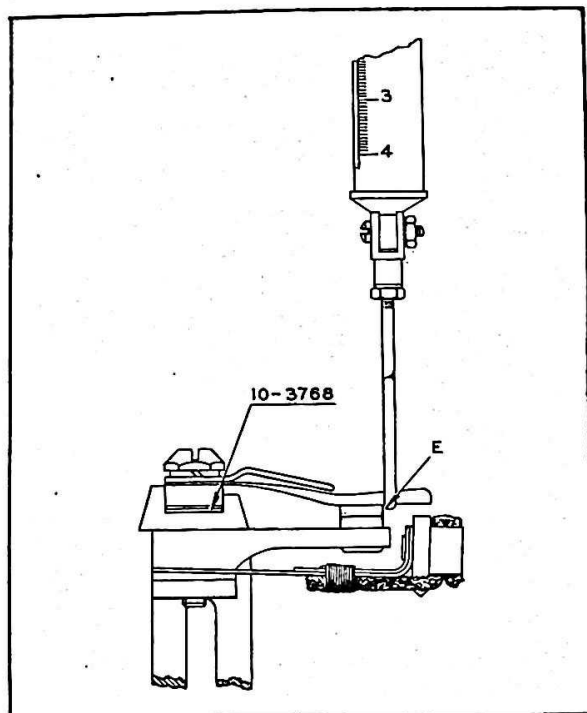


Figure 9 - Checking Breaker Main Spring Tension.

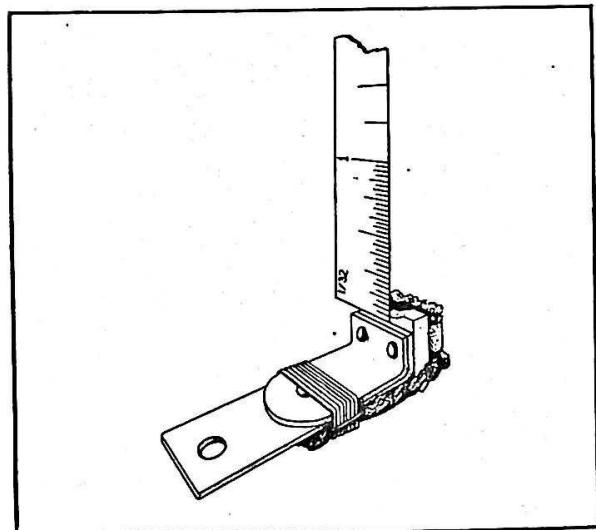


Figure 10 - Measuring Wear at Top of Cam Follower.

(3) Normal operation of the magneto causes a certain amount of wear to take place on the top of the cam follower. This wear is indicated by a small depression worn in the top of the cam follower. The distance between the lowest point of this depression and the

top of the spring on which the cam follower is riveted should be checked at each overhaul. The distance should be  $1/32$  inch or over. If it is less than  $1/32$  inch, a new cam follower should be installed. (See figure 10.)

(4) Use the No. 11-1275 assembly tool when assembling the component parts of the contact point assembly. The contact assembly screw must be tightened to a torque value of 15 to 20 inch-pounds, as measured with the No. 11-1681 tension wrench.

#### d. CAM ADAPTOR.

(1) Observe the adaptor casting to see if it incorporates holes for ventilation of the space between the two cam shaft bearings. Magnetos not having these holes should be modified to incorporate them in accordance with special instructions in section VI, paragraph 5. If magneto incorporates the ventilation holes, make sure they are open by blowing out with compressed air.

(2) Examine the cam gears for excessive wear of their teeth. Clean and inspect the two cam shaft ball bearings. If satisfactory, repack with specification No. AN-G-5 grease.

#### e. DISTRIBUTOR.

(1) Inspect the distributor finger and insulating sleeve for possible cracks. Clean the high tension electrode on the distributor finger and remove the pits. If the high tension electrode is burned or worn excessively, replace. Examine all of the gears for burrs or excessive wear of the teeth. Clean and inspect the ball bearings. If satisfactory, repack with specification No. AN-G-5 grease using No. 11-1959 ball bearing packer.

(2) The electrode height on the distributor finger should be checked after the finger is reassembled on the magneto. Refer to section VI, paragraph 3 a.

f. ROTATING MAGNET BALL BEARINGS. - Clean and inspect the rotating magnet ball bearings. If satisfactory, repack with specification No. AN-G-5 grease, using ball bearing packer No. 11-1959.

#### 4. REASSEMBLY.

Before reassembling, insure that all parts are clean and free from chips or foreign particles.

#### a. FRONT END PLATE.

(1) Install a new felt washer in the groove of the front end plate directly in back of the distributor gear axle ball bearing. Saturate this felt washer with No. VV-0-446a or its equivalent.

(2) Press the drive shaft ball bearing and the distributor gear axle ball bearing into their recesses in the front end plate,

using an arbor press and pressing tools No. 11-1382 and No. 11-1243, respectively. The open end of the drive shaft bearing faces the retainer. Secure these bearings with their corresponding retainers.

(3) Insert the distributor gear axle through the ball bearing. Make sure the felt washer is not loosened or rolled over while inserting the axle. Place Woodruff key in position and then install the large distributor gear on its axle. Use a new four ear lock washer and secure the axle to the gear with the hexagon head screw. Tighten this screw securely, using socket wrench No. 11-1260 and gear holder No. 11-1309. Tap the prebent ear of the four ear lock washer firmly against the sides of the hole into which it is seated. Lock by bending up one of the ears which will fit against a flat side of the screw. Insert the carbon brush assembly into the hole provided for it in the center of the hexagon head screw.

#### b. DISTRIBUTOR FINGER.

(1) Secure the distributor finger to the axle with its three screws and lock washers.

(2) Check the height of the high tension electrode of the distributor finger with gage No. 11-1230. If the electrode hits the "GO" side of the gage, remove the necessary amount of material from the electrode with a file. If the electrode clears the "NO GO" side of the gage, the electrode should be replaced. Check the new electrode after installing. (See figure 11.)



Figure 11 - Checking Height of Distributor Finger Electrode.

#### c. ROTATING MAGNET.

(1) Install the breaker end ball bearing. This is done by placing the drive shaft end of the magnet in the No. 11-1350 sleeve. Then, using an arbor press, press the breaker end ball bearing onto its shaft with the No. 11-1351 pressing tool. The shielded end of the bearing faces the magnet.

(2) Place the Woodruff key in the keyway provided on the breaker end of the magnet shaft. Install the small cam gear and secure it with the retainer, ear lock washer, and screw, making sure that the retainer is engaged with the keyway of the gear. Tap the short ear of the ear lock washer tightly into the slot in the retainer and lock by bending the other ear of the lock washer against a flat side of the screw.

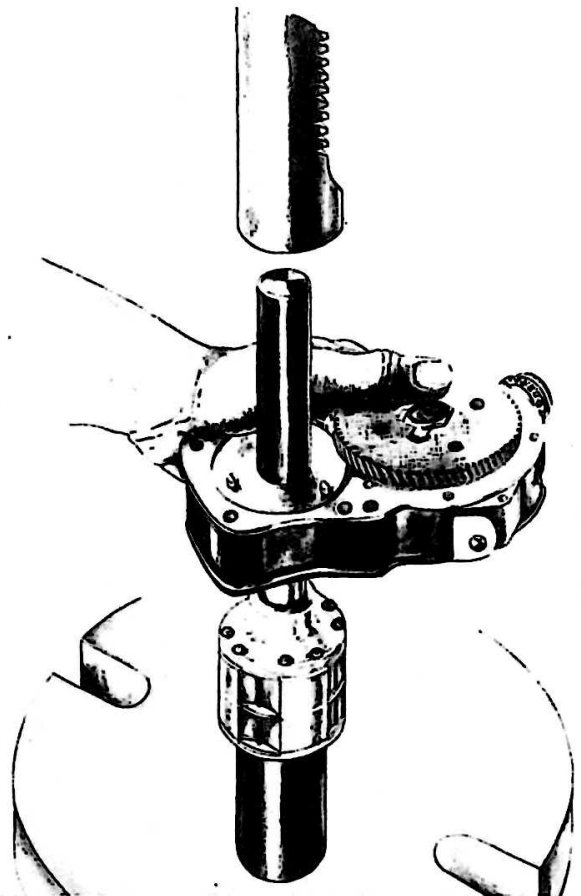


Figure 12 - Pressing Front End Plate onto the Rotating Magnet.

(3) Recharge the magnet with either 11-1301 magnet charger (110 volt D.C.), or 11-1302 magnet charger (36 volt D.C.).

(4) Place the breaker end of the rotating magnet in the No. 11-1203 sleeve. Place the insulating sleeve over the drive end of the magnet shaft with the flattened extension of the insulating sleeve up. Place the front end plate over the drive shaft end of the rotating magnet, and after making sure that the extension of the insulating sleeve is centered toward the distributor gear axle in the front end plate, press the front end plate into position, using the No. 11-1242 pressing tool in conjunction with an arbor press. (See figure 12.)

(5) Apply a light coating of S.A.E. 60 oil or its equivalent on the pole pieces of the rotating magnet. Make sure that the magnet is clean and free from chips or foreign particles. Then engage the front end plate and magnet assembly with the magneto housing. This is done by inserting the magnet as far as possible into the housing. Make sure that the insulating sleeve enters straight into the housing. Place the breaker end of the housing on the No. 11-1408 support and center the assembly in an arbor press. Press shaft and front end plate into position using the No. 11-1242 pressing tool over the drive gear end of the shaft.

(6) Make sure that the rotating magnet turns freely and does not bind at any place. Check the clearance between each pole piece and the pole shoes in the housing. The clearance must not be less than .0015 inch for any pole piece of the magnet. (See figure 13.)

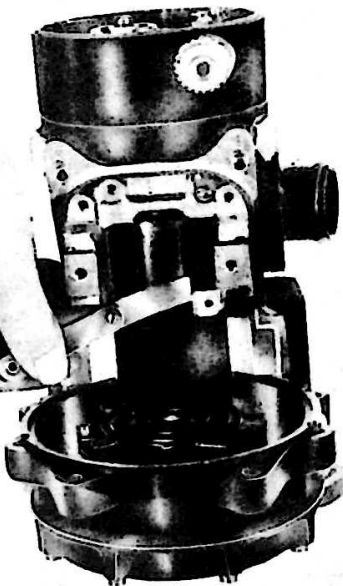


Figure 13 - Checking Clearance Between the Rotating Magnet and the Pole Shoes.

#### d. SMALL DISTRIBUTOR GEAR.

(1) Install the small distributor gear. The timing mark on the drive shaft spline must index with the timing mark on the hub of the small gear over one of its splines. (See figure 14.) Also, there are two timing marks adjacent to the teeth of the small gear. One is marked "R" for clockwise rotation and the other is marked "L" for anticlockwise rotation. Index the tooth marked "L" with the timing mark on the tooth of the large distributor gear.

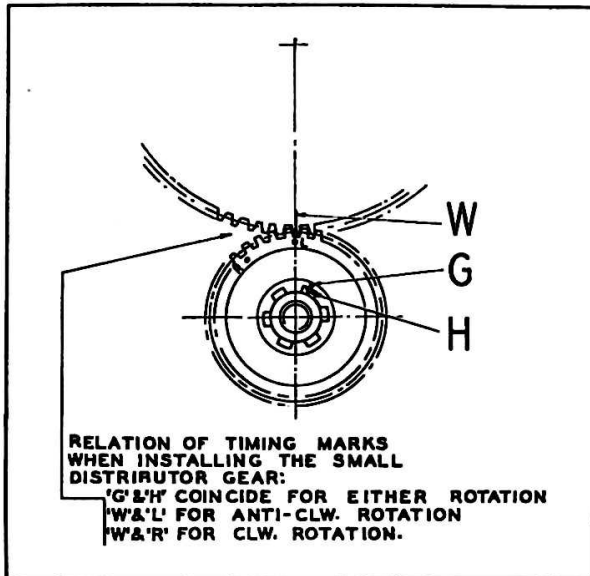


Figure 14 - Installing Small Distributor Gear on the Drive Shaft.

(2) Using indicator No. 11-1221, check the backlash of the distributor gears. If the backlash reading is more than .010 inch, the large gear should be replaced.

(3) Apply a small amount (about 1/2 ounce) of specification No. AN-G-5 grease evenly upon the teeth of the distributor gears.

e. MOUNTING FLANGE. - Place the magneto upright on the No. 11-1408 support, and install the mounting flange on the front end plate by tapping it into position. Insert and tighten the four large and six small screws, not omitting the lock washers.

#### f. CAM AND ADAPTOR ASSEMBLY.

(1) The front bearing (nearest the gear) must be installed in the adaptor first. The open end of the bearing faces inward. Press this bearing into position, using pressing tool No. 11-1032 and support No. 11-1432 in conjunction with an arbor press.



(2) Place the remaining bearing on the cam shaft with the shielded side of the bearing toward the tapered end of the shaft, and place the spacer on the shaft over the bearing.

(3) Insert cam shaft and bearing into adaptor as far as possible; then press into position, using pressing tool No. 11-1032 against the outer race of the bearing and support No. 11-1432 under the already installed bearing, allowing the cam shaft to extend up into the counterbored portion of No. 11-1032 tool.

(4) Push cam gear on cam shaft, engaging splines in any relation. The shouldered side of gear faces the bearing. (See figure 3.) Using a new four ear lock washer, secure the gear with the hexagon head screw. When tightening this screw, hold cam shaft with the No. 11-1735 wrench. Make sure the pre-bent ear of the lock washer is seated in the hole in gear. Lock the screw by bending up one of the ears which will fit against a flat side of the screw.

(5) Secure the flexible primary lead to the terminal post which extends through the adaptor. The position of this flexible primary lead must be such that its upper end can be secured to the condenser with the condenser securing screw.

(6) Apply a small amount of specification No. AN-G-5 grease evenly on the teeth of the large and small cam gears.

(7) Place adaptor in position on the magneto housing having the large cam gear mesh in any relation with the small cam gear. Make sure the flexible primary lead is in such a position that it can be secured with the condenser securing screw.

(8) Secure adaptor with its three screws "Q," plain washers, and lock washers. (See figure 3.)

#### G. TIMING OF CAM.

##### (1) ADJUST BACKLASH OF CAM GEARS.

(a) The cam gears must be set with a minimum perceptible backlash. To make this adjustment, loosen the three screws "Q." (See figure 3.) Then turn the adaptor to the right until the cam gears are meshed snugly with no perceptible backlash as felt by rocking the cam shaft by hand. Tighten screws "Q." Turn the rotating magnet by hand through ten or twelve complete revolutions while cam gears are meshed snugly to remove any burrs or foreign particles which may possibly be on the teeth of the cam gears.

(b) Loosen the screws "Q" and turn adaptor to the left until a small amount of backlash can be felt when rocking the cam shaft by hand. Then turn the adaptor just slightly to the right again until a minimum backlash

is obtained without having the cam gears too tight. After this adjustment, tighten the screws "Q" securely.

(c) Check the backlash at several positions of the cam gears. This is done by turning the rotating magnet a few degrees at a time through one revolution of the large cam gear, and rocking the cam shaft by hand at each new position to make sure that there are no tight spots and that the backlash is not excessive at any position of the cam gears.

(d) When the correct adjustment of the gears has been obtained, tighten screws "Q" and safety the bottom and right hand screws.

##### (2) LOCK ROTATING MAGNET IN THE NO. 1 "E" GAP POSITION.

(a) Place timing disc No. 11-1401 on the drive shaft and attach the No. 11-1491 pointer in one of the elongated slots in the mounting flange.

#### NOTE

When using the No. 11-1401 timing disc with SF9LN-4 magnetos, it will be necessary to provide a spacing washer for use under the timing disc to prevent the locking sleeve of the timing disc from displacing the oil seal in the front end plate when timing disc is locked. Any washer having a hole diameter of approximately 7/8 inch will be satisfactory.

(b) Next, turn the drive shaft in the direction of normal operating rotation until the timing mark "A" on the distributor finger approximately coincides with the timing mark "B" on the inside of the front end plate. (See figure 3.) Then turn the drive shaft a few degrees in the opposite direction until the rotating magnet is in its neutral position. When the magnet is in its neutral position the pole piece is centered and completely fills the space between the pole shoes on the magneto housing.

(c) When the rotating magnet is in the neutral position, from which the No. 1 "E" gap must be measured, set the pointer over a degree marking on the timing disc. Now turn the rotating magnet in direction of normal rotation to the No. 1 "E" gap position which is obtained when the rotating magnet is turned past its exact neutral position the number of degrees stamped on the cam or shown as follows:

ENGINE	NO. 1 "E" GAP
Wright R-1820	12 degrees

(d) By means of the locking device on the timing disc, lock rotor at the No. 1 "E" gap position. After it is locked, recheck the degree reading to make sure that the rotor did

not creep when locked in position. It is very important that the rotor be locked accurately at the exact No. 1 "E" gap position.

(3) SET CAM IN PROPER RELATION TO TIMING MARKS ON RIM OF ADAPTOR.

(a) See that tapered surfaces of cam shaft and cam are free of all dust or dirt particles which might prevent cam from seating properly. Also see that the top adjusting ratchet fits freely over the splines on end of cam shaft. Put a little grease on the splines as it is necessary to have the ratchets operate absolutely free, otherwise the work of timing the cam will be interfered with.

(b) Place cam lightly on its tapered shaft so that it can be turned by hand. Mesh the adjusting ratchet which has teeth on both sides with the teeth in the recess of the cam. The teeth on one side of this adjusting ratchet will not mesh with the teeth in the cam recess so make sure that the correct side is used. Then place the top adjusting ratchet over the splines on the cam shaft such that its teeth will mesh with the teeth of the intermediate ratchet. Place the chamfered washer in position on the top adjusting ratchet. Then place the No. 11-1520 tension spring over the cam securing screw. Screw in cam screw about one quarter of its length. Place the No. 11-1594 cam setting tool in position and screw in the cam screw until the No. 11-1520 tension spring will just cause a clicking effect between the adjusting ratchets when the cam is turned. Turn the cam by means of the No. 11-1594 cam setting tool until the straight edge on the timing tool (represented by "K" in figure 3) coincides with the timing marks "M" and "N" on the rim of the adaptor. THIS SETTING IS VERY IMPORTANT. The ratchets located under the cam screw provide for this fine adjustment. The cam can be turned by means of the No. 11-1594 cam setting tool one tooth forward and one back, thereby moving the cam in the anticlockwise rotation only a fraction of a degree because of the uneven number of teeth on the ratchets. The ratchets must be fully meshed when the timing tool coincides with the timing marks "M" and "N". If the ratchets are not fully meshed when the straight edge coincides with the timing marks, the cam may turn slightly when its securing screw is tightened, or might possibly loosen when running on the engine.

(c) When the cam is set, remove the No. 11-1520 tension spring and place the lock washer over the cam screw. Hold the No. 11-1594 cam setting tool firmly with the hand in the position where it coincides with the timing marks "M" and "N" and tighten the cam screw securely.

(d) After tightening the cam screw, disengage the locking device on the magnet and recheck the setting of the cam to make sure

the straight edge coincides exactly with the timing marks "M" and "N" when the rotating magnet is in the No. 1 "E" gap position.

(e) Check eccentricity of cam to make sure there are no foreign particles or burrs on the tapered surfaces. Eccentricity can be checked by measuring the contact point clearance on four lobes approximately 90 degrees apart. Eccentricity must not exceed .001 inch.

(4) CONDENSER. - Place the condenser insulating plate in position between the pole shoes. Secure condenser in place with its two screws nearest the front but do not tighten. Secure the laminated primary connectors, insulating bushings and rear securing screws with their plain washers and lock washers, making sure the laminated connectors do not touch the screws at any place. The connector for the coil must be secured in position so that it can be connected to the primary insert of the coil.

(5) COIL. - Secure coil in position with its four fastening screws and washers. Connect the flexible primary lead from the condenser to the coil by means of the screw provided.

(6) CONTACT BREAKER ASSEMBLY.

(a) Place the eccentric screw in position and secure the contact point assembly with its two screws. Fasten the primary connector with its screw "F."

(b) Fasten the primary connector which leads from the terminal post to the contact point assembly, and install the ground terminal assembly.

(c) Adjust the contact points. To do this, loosen the screws "O" (figure 3) and turn eccentric "P" until the contact points just begin to open on No. 1 cam lobe when the straight edge "K" coincides with the timing marks "M" and "N." When this adjustment has been made, tighten the screws "O."

(7) DISTRIBUTOR FINGER.

(a) After the magneto is timed, check the position of the timing marks "A" and "B" (figure 3) when the contact points just begin to open on the No. 1 lobe, to make sure the distributor gears are meshed correctly. Timing marks "A" and "B" should approximately align.

(b) Also, check the timing further by placing gage No. 11-1231 on top of the magneto housing adjacent to the front end plate. Make sure that the gage is centered between the recessed edges of the front end plate. The high tension electrode on the distributor finger must cover at least 50 percent of the gage when the contact points just begin to open on the No. 1 lobe of the cam.

(8) CAM FOLLOWER.

(a) Observe the cam follower felt to make sure it is properly lubricated. If oil appears on the surface of the felt when it is squeezed with the fingers, no oil is needed. If felt is dry, add a few drops of aircraft engine oil, S.A.E. No. 60, or equivalent grade under Army and Navy specifications. Avoid an excess of oil.

(b) Allow the felt wick in the plunger oiler to absorb as much oil as possible. Use same oil as recommended for cam follower. Remove excess oil and install the oiler in the adaptor making sure that it does not touch the cam except when plunger is pushed.

(9) BREAKER COVER, DISTRIBUTOR BLOCK, AND COIL COVER.

(a) Secure the breaker cover in position with its three fastening screws.

(b) Install the distributor block in the radio shield halves, securing it with two screws near the base of the shields. Fasten the shield halves together with the clamping screws. Depress the high tension contact button and place the radio shield and distributor block assembly in position.

(c) Install the coil cover on the magneto and secure it at the breaker end with the two screws. Secure the coil cover and radio shield to the front end plate with the six long screws. All the coil cover screws should carry lock washers.

(d) On early execution SF9LN-4 magnetos a velmold gasket was used between the radio shield and the radio shield adaptor. Later this was discontinued and No. 47 compound was used to seal the joint between the adaptor and the shield, to lessen radio interference. A new gasket No. 10-30813, made of neoprene and No. 16 mesh aluminum wire is now available and should be installed in place of the velmold gasket or the No. 47 compound. The No. 10-30813 gasket has been found adequate for sealing and radio interference.

5. SPECIAL INSTRUCTIONS FOR INSCRIBING TIMING MARKS ON NEW ADAPTOR OR DRILLING VENT HOLES IN AN ADAPTOR.

a. INSCRIBING TIMING MARKS WHEN INSTALLING A NEW ADAPTOR FOR CAM REDUCTION GEARS.

NOTE

These instructions apply only when installing a new adaptor and therefore do not concern magnetos in service which have the timing marks inscribed on the rim of the adaptor.

(1) When installing a new adaptor for the cam reduction gears, the timing marks "M" and

"N" (figure 3) must be inscribed on the rim. To accurately locate the position of these timing marks, follow the procedure outlined below.

(2) Assemble magneto in regular manner using the new adaptor. Adjust backlash of cam gears as instructed in this section, paragraph 4., g., (1).

(3) Adjust contact points to a .012 inch clearance. Then turn drive shaft until contact points are being actuated by the No. 1 lobe of the breaker cam. Using timing disc No. 11-1401 and timing disc pointer No. 11-1491, check the total number of drive shaft degrees of contact point opening on the No. 1 lobe. This is done by turning the drive shaft until the No. 1 lobe just begins to open the contact points at which time the timing disc reading is taken. Then turn the drive shaft until the contact points just close on the No. 1 lobe at which time the timing disc reading is again taken. The difference between the two timing disc readings gives the actual number of drive shaft degrees of contact point opening on the No. 1 lobe. The contact point opening on the No. 1 lobe must correspond to the value given in the following table for the specific engine. The position of contact point opening can be conveniently determined by using the Abbott A-100 timing light or its equivalent.

ENGINE	CONTACT POINT OPENING (MEASURED ON DRIVE SHAFT)
Wright R-1820	50 degrees plus or minus 2

(4) If the reading is not within the tolerance given in the table, reduce or increase the contact point clearance until the number of degrees of contact point opening is correct. The number of degrees of contact point opening is increased by increasing the contact point clearance and decreased by decreasing the contact point clearance.

(5) Using timing disc No. 11-1401 and the timing disc pointer No. 11-1491, lock the rotating magnet in its No. 1 "E" gap position. (Refer to paragraph 4., g., (2) in this section.)

(6) Using the No. 11-1594 cam setting tool, turn cam until contact points just begin to open on the No. 1 lobe and tighten cam securing screw. Unlock the rotating magnet and recheck the setting of the contact points to make sure that they just begin to open at the No. 1 "E" gap position. Check eccentricity of cam to make sure there are no foreign particles or burrs on the tapered surfaces. Eccentricity can be checked by measuring the contact point clearance on four lobes approximately 90 degrees apart.

(7) After the foregoing adjustments are made, turn drive shaft again until contact points just begin to open on the No. 1 lobe

and inscribe the timing marks "M" and "N" on the rim of the adaptor in line with the step on the cam. After timing marks are inscribed, recheck the adjustment.

(8) The timing marks when accurately inscribed can be used for all subsequent adjustments and timing purposes.

b. ADAPTOR BEARING VENT HOLES.

(1) Under certain conditions of altitude and temperature, the lubricant used in the cam shaft ball bearings of the subject type magnetos may leak through the seal of the rear bearing and get into the breaker compartment. Should this occur, there is a possibility of the grease reaching the contact point with resultant fouling and burning.

(2) Observation indicates that troubles of this nature are caused by a slight pressure which is built up in the space between the two cam shaft bearings at high temperatures or altitudes. The pressure forces the lubricant through the seals of the bearings.

(3) The pressure can be eliminated by venting the space between the bearings, and it has been found that this stops the grease leakage. Current production magnetos of the subject types have vent holes drilled in the adaptors for this purpose.

(4) It is recommended that subject type magnetos now in service be modified at the overhaul to incorporate this improvement. This is easily accomplished by drilling two small holes in the adaptor. Locate and drill the holes as shown in figure 15.

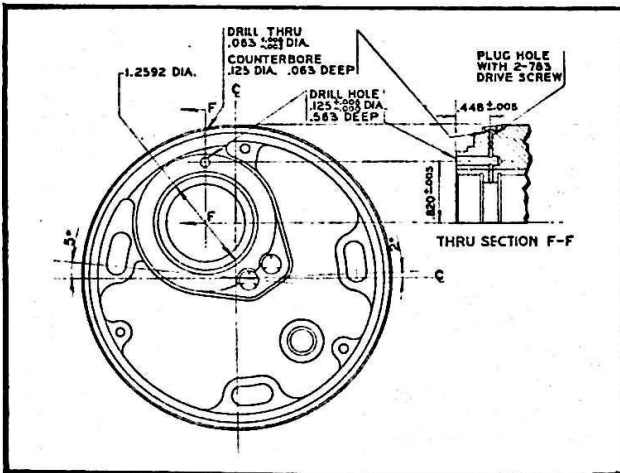


Figure 15 - Location of Ventilation Holes in the SF9LN-4 Adaptor

(5) After drilling the holes, plug the vertical hole at the outer end to prevent entry of dirt or moisture. For this purpose use Scintilla part number 2-783 drive screw or Parker Kalon No. 0 x 3/16 inch type "U" round head, dull nickel plated, drive screw, or equivalent. The hole is counterbored as shown to accommodate the head of the drive screw. After installing drive screw,peen the edges of the hole over the screw slightly.

(6) When properly drilled, the holes provide a vent into the gear compartment. This equalizes pressures and serves the further purpose of carrying any excess of lubricant back to the gears instead of into the breaker.

6. CLEANING AND TREATMENT OF DIELECTRIC PARTS.

a. The treating of magneto coils and distributor fingers that incorporate condensers or windings which might be harmed by immersion will be treated as follows:

(1) Clean the part by wiping with a cloth moistened with acetone, Specification No. 0-A-51-A.

(2) Allow the part to air-dry for approximately 30 minutes to eliminate acetone fumes.

(3) Apply a coating of oil to the part by rubbing with a cloth dipped in aircraft engine oil, Specification No. AN-VV-0-446a, Grade 1080.

(4) Remove excess oil by wiping with a clean dry cloth.

b. All types of dielectric parts that do not incorporate condensers or windings will be treated as follows:

(1) Vigorously scrub the part using acetone, Specification No. 0-A-51-A, with a brush having non-metallic bristles.

(2) Allow part to air-dry for approximately 30 minutes to eliminate acetone fumes.

(3) Dry part for 30 minutes in an oven with the temperature regulated between 54.4°C (130°F) and 65.5°C (150°F).

(4) Immerse the part in aircraft engine oil, Specification No. AN-VV-0-446a, Grade 1080 for a period of two hours.

(5) Remove part from the bath and allow to drain.

(6) Remove excess oil by wiping with a clean dry cloth.



SECTION VII  
MAGNETO TEST PROCEDURE

1. MOUNTING MAGNETO ON TEST STAND.

a. Mount the magneto on the No. 11-700 or equivalent test stand which incorporates an adjustable test gap panel. Use the No. 11-708 drive assembly.

b. Connect the high tension cables to the spark rack set with 7 mm. gaps. (See figure 16.) Run the magneto at normal speeds for two or three minutes to observe mechanical operation.

2. COMING-IN SPEED TEST.

Check the coming-in or lowest speed at which the rotating magnet must be turned to produce consistent sparking at all of the gaps. The magneto should spark consistently at 135 R.P.M. If the coming-in speed is above 135 R.P.M. (drive shaft speed), the probable causes are as follows:

- a. Coil.
- b. Contact Point Adjustment.
- c. Distributor Block Electrode Clearance.
- d. Weak Magnet.

3. RUNNING TEST.

a. Run the magneto at 3000 R.P.M. (drive shaft speed). Observe sparks closely. If skipping occurs, check coil and internal timing.

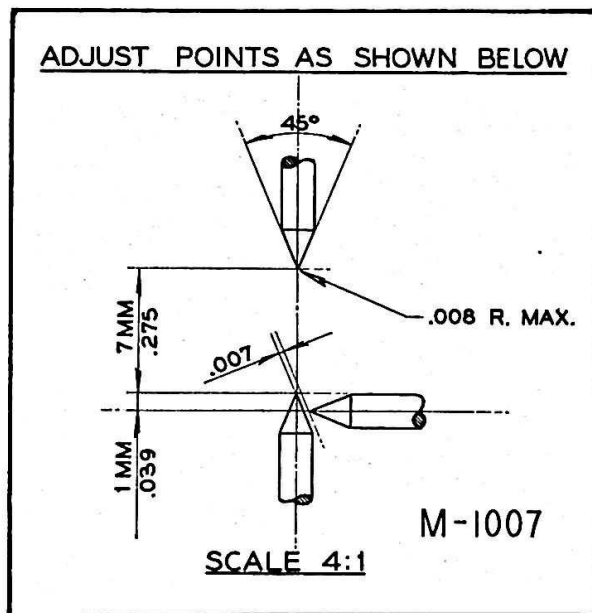


Figure 16 - Correct Setting of Standard 7 mm., 3 point Spark Gap.

b. Check the ground or switch terminal. When the magneto is short-circuited through this terminal, sparks should not occur at the spark panel.

4. BOOSTER TEST.

Connect the cable from the booster source to the booster terminal on the magneto. Run the magneto at 150 R.P.M. and observe to make sure the booster current is being distributed to the spark gaps.

5. ROTATING MAGNET.

The magnetic strength of the rotating magnet is checked by measuring the primary current output. Operate the magneto for about five minutes at 2500 R.P.M. During this run, short-circuit the magneto through the ground or switch terminal several times. Then reduce the speed to 400 R.P.M. (Drive shaft speed - must not vary more than 10 R.P.M. when measuring primary current output.) Hold the contact points open by inserting a piece of insulating material between them. Connect the ammeter No. 11-1124 across the contact points. The reading at 400 R.P.M. should be 1.8 amperes or over. If it is below, recharge the magnet and make another test before rejecting the magnet.

6. COIL.

a. Before installing the coil in the magneto, a preliminary check can be made by measuring the resistance of the secondary winding with the No. 11-1274 ohmmeter. The reading must be from 5000-9000 ohms.

b. The final test of a coil must be made an actual running test of the magneto on the test bench. Also, as heat from the engine affects the insulating materials of the coil, the final test should be made at an elevated temperature. This is done by directing a reflector type heater on the magneto while it is being run on the test bench. When the temperature of the coil has reached approximately 74 degrees C. (165 degrees F.) the spark gaps should be increased by means of the adjustable panel from 7 mm. to 9 mm. At 2000 R.P.M. the coil must spark consistently at this temperature and spark gap. Increase the gaps to 10 mm. The coil should spark fairly consistently at this gap. However, intermittent missing with the 10 mm. gap will not be sufficient cause to reject the coil.

c. It may be found that the coil produces consistent sparking at room temperature with 7 mm. gaps, however, if the coil does not spark consistently at the elevated temperature with 9 mm. gaps, it should not be used for further service.

7. PRIMARY CONDENSER.

At locations where 110 volt, 60 cycle, alternating current is available, use the No. 11-1767 primary condenser tester, in accordance with the instructions furnished with this instrument. A megger having an output of not over 500 volts can also be used to check the condenser. The condenser must be heated to 87 degrees C. (190 degrees F.) for the megger test. Do not prolong the test more than 30 seconds. At 87 degrees C. (190 degrees F.) the megger reading must be 50,000

ohms or over. If the reading is less than 50,000 ohms the condenser is not fit for further service and should be discarded.

8. LEATHER PLUGS OVER SCREWS IN FRONT END PLATE.

After testing and final assembly of all parts insert new leather plugs over the ends of the four screws which secure the flange and front end plate to the housing. The plugs may be tapped into place with a fiber drift and light hammer. Install drive coupling.

## PARTS CATALOG

### SECTION I

#### INTRODUCTION

1. This catalog refers only to the type SF9LN-4 aircraft magneto manufactured by the Scintilla Magneto Division, Bendix Aviation Corporation.

2. The Group Assembly Parts List, Section II, consists of a break-down of the complete accessory in serviceable subassemblies and detailed parts. Each subassembly listed is directly followed by its component parts properly indented to show their relationship to the subassembly. The quantities specified are those used at the location shown and not necessarily the total used per unit.

3. The Numerical Parts List, Section III, lists part numbers numerically, exclusive of standard parts which are shown in Section IV. The column headed "Group-List Page No." refers to pages of the Group Assembly Parts List. The column headed "Total Quantity" indicates total number used per accessory.

4. The Standard Parts List, Section IV, lists AN parts and total quantity.

5. The basic magneto assemblies covered in this parts catalog are designated by a part number. Variations of the basic assembly due to the difference in engines on which these magnetos are installed are indicated by a suffix number separated from the basic assembly number by a dash, i.e: 10-00000-0. When ordering spare parts, the variations under the installation numbers should be consulted to insure that the correct parts are being ordered. The installation number should correspond with the manufacturer's drawing number given on the magneto identification plate.

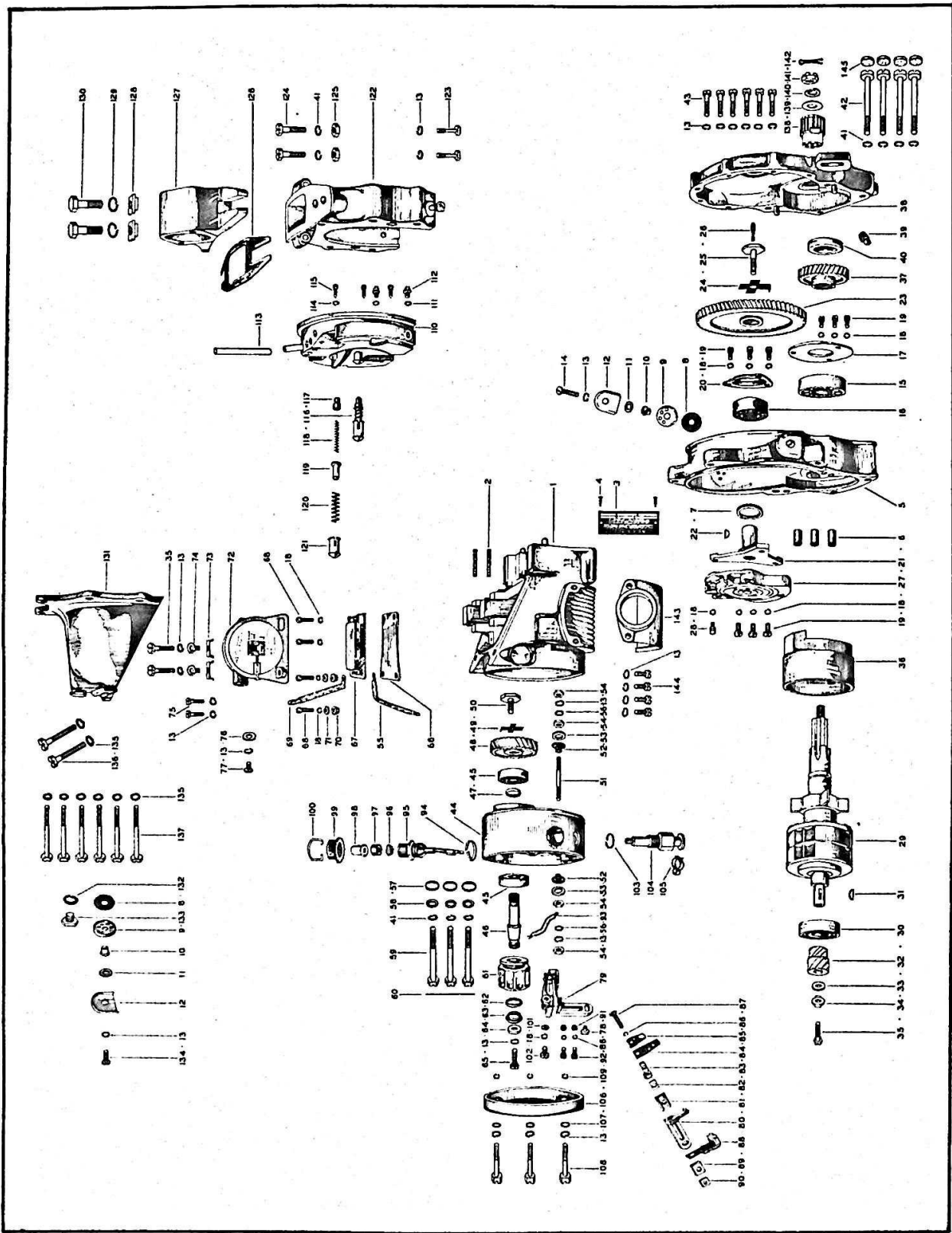


Figure 17 - Exploded View of Detail Parts  
SF9LN-4 Magneto



RESTRICTED  
AN 03-5DA-14  
SECTION II—GROUP ASSEMBLY PARTS LISTS

FIG. NO.	INDEX NO.	SYMBOL	GROUP Engine Accessories							UNITS PER ASSY	PROPERTY CLASSIFICATION			
			MAJOR ASSEMBLY Magneto Assembly - Type SF9LN-4								U.S. NAVY	U.S. ARMY	BRITISH	
			PART NUMBER	1	2	3	4	5	6					NOMENCLATURE
			10-20700	BASIC MAGNETO ASSEMBLY - Type SF9LN-4									03-H	137A
17	1		10-20734	HOUSING, Magneto							1		03-H	137A
17	2		2-274	STRIP, Felt							As Req.		03-H	137A
17	3		2-782Z	PLATE, Magneto Identification							1		03-H	137A
17	4		AN535-0-3	DRIVE SCREW, Identification Plate							2		29	128
17	5		10-19901	PLATE, Front End							1		03-H	137A
17	6		10-17535	PLUG, Rubber							3		03-H	137A
17	7		10-7454	FELT WASHER, Axle Bearing Grease Retaining							1		03-H	137A
17	8		10-9354	SCREEN, Ventilator							2		03-H	137A
17	9		10-7441	RETAINER, Ventilator Screen							2		03-H	137A
17	10		10-9966	SPACER, Ventilator Shield							2		03-H	137A
17	11		10-9292	WASHER, Ventilator Shield							2		03-H	137A
17	12		10-9967	SHIELD, Ventilator							2		03-H	137A
17	13		AN935-10	LOCK WASHER, Ventilator Screw							2		29	128
17	14		10-14884	SCREW, Ventilator							2		03-H	137A
17	15		*8504X	BEARING, Ball, New Departure(10-4305)							1		*29	137A
17	16		*5202X3017	BEARING, Ball, New Departure(10-1471)							1		*29	137A
17	17		10-4230	RETAINER, Drive End Bearing							1		03-H	137A
17	18		AN935-8	LOCK WASHER, Bearing Retainer Screw							3		29	128
17	19		10-2039	SCREW, Bearing Retainer							3		03-H	137A
17	20		10-4229	RETAINER, Large Gear Axle Bearing							1		03-H	137A
17	21		AN935-8	LOCK WASHER, Bearing Retainer Screw							3		29	128
17	22		10-2039	SCREW, Bearing Retainer							3		03-H	137A
17	23		10-19905	AXLE, Large Gear							1		03-H	137A
17	24		2-181	WOODRUFF KEY, Large Gear							1		03-H	137A
17	25		10-4904Z	GEAR, Large Distributor							1		03-H	137A
17	26		10-4226	LOCK, 4 Bar							1		03-H	137A
17	27		10-17184	SCREW, Large Gear							1		03-H	137A
17	28		10-12647	CARBON BRUSH, Large Gear Screw							1		03-H	137A
17	29		10-15970W	FINGER, Distributor, Anti-clw.							1		03-H	137A
17	30		AN935-8	LOCK WASHER, Finger Electrode							1		29	128
17	31		10-18378	ELECTRODE, Distributor Finger							1		03-H	137A
17	32		AN935-8	LOCK WASHER, Finger Screw							3		29	128
17	33		10-2039	SCREW, Distributor Finger							3		03-H	137A
17	34		10-19903	MAGNET, Rotating							1		03-H	137A
17	35		*7503T1337	BEARING, Ball, New Departure(10-6042)							1		*29	137A
17	36		2-828Z	WOODRUFF KEY, Small Cam Gear							1		03-H	137A
17	37		10-17537	GEAR, Small Cam							1		03-H	137A
17	38		10-9881	RETAINER, Small Cam Gear Screw							1		03-H	137A
17	39		10-12091	WASHER, 2 Bar Lock							1		03-H	137A
17	40		10-5600	SCREW, Small Cam Gear							1		03-H	137A
17	41		10-17534Y	SLEEVE, Magnet Insulating							1		03-H	137A
17	42		10-5225	GEAR, Small Distributor							1		03-H	137A
17	43		10-17896	FLANGE, Mounting							1		03-H	137A
17	44		10-1125	PLUG, Oil Drain Hole							1		03-H	137A
17	45		10-17900Y	OIL SEAL, Drive Shaft							1		03-H	137A
17	46		10-3677	LOCK WASHER, Flange, End Plate to Housing Screw							4		03-H	137A
17	47		10-4339	SCREW, Flange, End Plate to Housing							4		03-H	137A
17	48		AN935-10	LOCK WASHER, Flange to End Plate Screw							6		29	128
17	49		10-13544	SCREW, Flange to End Plate							6		03-H	137A
17	50		10-19754Y	ADAPTOR, Breaker							1		03-H	137A
17	51		*7501L1144	BEARING, Ball, New Departure(10-20863)							1		*29	137A
17	52		10-19756	SHAFT, Cam							1		03-H	137A
17	53		*7501L1144	BEARING, Ball, New Departure(10-20863)							1		*29	137A
17	54		10-18464	SPACER, Cam Shaft Bearings							1		03-H	137A
17	55		10-19757	GEAR, Large Cam							1		03-H	137A
17	56		10-15738	WASHER, 4 Bar Lock							1		03-H	137A
17	57		10-15739	SCREW, Large Cam Gear							1		03-H	137A
17	58		10-16581	STUD, Primary Connector							1		03-H	137A
17	59		10-2636	BUSHING, Insulating							2		03-H	137A
17	60		10-3659	PLAIN WASHER, Connector Stud Nut							2		03-H	137A
17	61		10-18536	NUT, Connector Stud							2		03-H	137A

RESTRICTED

RESTRICTED  
AN 03-5DA-14  
SECTION II—GROUP ASSEMBLY PARTS LISTS

FIG. NO.	INDEX NO.	STOCKED	GROUP Engine Accessories							UNITS PER ASSY	PROPERTY CLASSIFICATION		
			MAJOR ASSEMBLY Magneto Assembly - Type SF9LN-4								U.S. NAVY	U.S. ARMY	BRITISH
			PART NUMBER	1	2	3	4	5	6				
17	55		10-17544							1		03-H	137A
17	56		10-3317							1		03-H	137A
17	13		AN935-10							1		29	128
17	54		10-18536							1		03-H	137A
17	57		10-25049							3		03-H	137A
17	58		10-637							3		03-H	137A
17	41		10-3677							3		03-H	137A
17	59		10-22557							3		03-H	137A
17	60		10-599A							AsReq		03-H	137A
17	61		10-17547							1		03-H	137A
17	62		10-15741							1		03-H	137A
17	63		10-18247							1		03-H	137A
17	64		10-5500							1		03-H	137A
17	13		AN935-10							1		29	128
17	65		10-3660							1		03-H	137A
17	66		10-16296							1		03-H	137A
17	67		10-12593Y							1		03-H	137A
17	18		AN935-8							2		29	128
17	68		10-17624							2		03-H	137A
17	69		10-16620							1		03-H	137A
17	70		10-16297							2		03-H	137A
17	71		AN960-8							2		04-A	128
17	18		AN935-8							2		29	128
17	68		10-17624							2		03-H	137A
17	72		10-13623Y							1		03-H	137A
17	73		10-5038							2		03-H	137A
17	74		10-3983							2		03-H	137A
17	13		AN935-10							2		29	128
17	35		10-5600							2		03-H	137A
17	13		AN935-10							2		29	128
17	75		10-13126							2		03-H	137A
17	76		10-598							1		03-H	137A
17	13		AN935-10							1		29	128
17	77		10-2684							1		03-H	137A
17	78		10-5322							1		03-H	137A
17	79		10-14447							1		03-H	137A
17	80		10-2976							1		03-H	137A
17	81		10-3263							1		03-H	137A
										</			

RESTRICTED  
AN 03-5DA-14

SECTION II—GROUP ASSEMBLY PARTS LISTS

FIG. NO.	INDEX NO.	STOCKED	GROUP Engine Accessories							UNITS PER ASSY	PROPERTY CLASSIFICATION		
			MAJOR ASSEMBLY Magneto Assembly - Type SF9LN-4								U.S. NAVY	U.S. ARMY	BRITISH
			PART NUMBER	1	2	3	4	5	6	NOMENCLATURE			
17	97		10-18050							1		03-H	137A
17	98		10-18592Y							1		03-H	137A
17	99		AN3105-6							1		03-H	137A
17	100		10-5200							1		03-H	137A
17	101		10-4358							1		03-H	137A
17	18		AN935-8							1		29	128
17	102		10-18003							1		03-H	137A
17	103		10-17050							1		03-H	137A
17	104		10-17044							1		03-H	137A
			10-17045							1		03-H	137A
			10-17047							1		03-H	137A
			10-17046							1		03-H	137A
			10-17048							1		03-H	137A
			10-17049							1		03-H	137A
			10-17054							1		03-H	137A
17	105		10-22779							1		03-H	137A
17	106		10-17531							1		03-H	137A
17	107		10-21673							3		03-H	137A
17	13		AN935-10							3		29	128
17	108		10-19947							3		03-H	137A
17	109		10-17066							3		03-H	137A
17	110		10-4879U							1		03-H	137A
17	111		2-541							9		03-H	137A
17	112		10-4883							9		03-H	137A
17	113		10-20676							1		03-H	137A
17	114		2-679							1		03-H	137A
17	115		2-185							10		03-H	137A
17	116		10-14931Y							1		03-H	137A
17	117		10-21495							1		03-H	137A
17	118		10-19433							1		03-H	137A
17	119		10-19435							1		03-H	137A
17	120		10-8584Y							1		03-H	137A
17	121		10-8583							1		03-H	137A
			10-17475Y							1		03-H	137A
17	122		10-17476Y							1		03-H	137A
17	13		AN935-10							2		29	128
17	123		10-7121							2		03-H	137A
17	124		10-5790							2		03-H	137A
17	41		10-3677							2		03-H	137A
17	125		10-5791							2		03-H	137A
17	126		10-30813							1		03-H	137A
17	127		10-17376							1		03-H	137A
17	128		10-17380							2		03-H	137A
17	129		10-2163							2		03-H	137A
17	130		10-17381							2		03-H	137A
17	131		10-17530Y							1		03-H	137A
17	132		10-12097							1		03-H	137A
17	133		10-12362							1		03-H	137A
17	8		10-9354							1		03-H	137A
17	9		10-7441							1		03-H	137A
17	10		10-9966							1		03-H	137A
17	11		10-9292							1		03-H	137A
17	12		10-9967							1		03-H	137A
17	13		AN935-10							1		29	128
17	134		10-18516							1		03-H	137A
17	135		2-281							2		03-H	137A
17	136		10-18522							2		03-H	137A
17	135		2-281							6		03-H	137A

RESTRICTED

RESTRICTED  
AN 03-5DA-14  
SECTION II—GROUP ASSEMBLY PARTS LISTS

FIG. NO.	INDEX NO.	STOCKED	GROUP Engine Accessories							UNITS PER ASSY	PROPERTY CLASSIFICATION		
			MAJOR ASSEMBLY Magneto Assembly - Type SF9LN-4								U.S. NAVY	U.S. ARMY	BRITISH
			PART NUMBER	1	2	3	4	5	6				
17	137		10-8489							6		03-H	137A
17	138		AN4084-1							1		03-H	137A
17	139		10-5498							1		03-H	137A
17	140		AN935-616L							1		29	128
17	141		10-948Z							1		03-H	137A
17	142		AN380C3-3							1		29	128
17	143		10-17981							1		03-H	137A
17	13		AN935-10							1		29	128
17	144		10-4018							4		03-H	137A
17	145		10-13222							4		03-H	137A
			10-20700-1										
			INSTALLATION - Magneto - Type SF9LN-4										
			Same as Basic Magneto Assembly, Type SF9LN-4, No. 10-20700										
			With No Exceptions										
			10-20700-6										
			INSTALLATION - Magneto - Type SF9LN-4										
			Same as Basic Magneto Assembly, Type SF9LN-4, No. 10-20700										
			Except:										
			Remove										
17	27		10-15970W							1		03-H	137A
			And details.										
			Add										
			10-29704							1		03-H	137A
			AN935-8							1		29	128
			10-18378							1		03-H	137A



**RESTRICTED**  
AN 03-5DA-114  
**SECTION II—GROUP ASSEMBLY PARTS LISTS**

FIG. NO.	INDEX NO.	STOCKED	GROUP Engine Accessories							UNITS PER ASSY	PROPERTY CLASSIFICATION			
			MAJOR ASSEMBLY Magneto Assembly - Type SF9LN-4								U.S. NAVY	U.S. ARMY	BRITISH	
			PART NUMBER	1	2	3	4	5	6	NOMENCLATURE				
17			10-21225	BASIC MAGNETO ASSEMBLY - Type SF9LN-4									03-H	137A
17	1		10-20734	HOUSING, Magneto							1		03-H	137A
17	2		2-274	STRIP, Felt							As Req		03-H	137A
17	3		2-782Z	PLATE, Magneto Identification							1		03-H	137A
17	4		AN535-0-3	DRIVE SCREW, Identification Plate							2		29	128
17	5		10-21277	PLATE, Front End							1		03-H	137A
17	6		10-17535	PLUG, Rubber							3		03-H	137A
17	7		10-7454	FELT WASHER, Axle Bearing Grease							1		03-H	137A
				Retaining										
17	8		10-9354	SCREEN, Ventilator							2		03-H	137A
17	9		10-7441	RETAINER, Ventilator Screen							2		03-H	137A
17	10		10-9966	SPACER, Ventilator Shield							2		03-H	137A
17	11		10-9292	WASHER, Ventilator Shield							2		03-H	137A
17	12		10-9967	SHIELD, Ventilator							2		03-H	137A
17	13		AN935-10	LOCK WASHER, Ventilator Screw							2		29	128
17	14		10-14884	SCREW, Ventilator							2		03-H	137A
17	15		*8504X	BEARING, Ball, New Departure(10-4308)							1		*29	137A
17	16		*5202X3017	BEARING, Ball, New Departure(10-1471)							1		*29	137A
17	17		10-4230	RETAINER, Drive End Bearing							1		03-H	137A
17	18		AN935-8	LOCK WASHER, Bearing Retainer Screw							3		29	128
17	19		10-2039	SCREW, Bearing Retainer							3		03-H	137A
17	20		10-4229	RETAINER, Large Gear Axle Bearing							1		03-H	137A
17	18		AN935-8	LOCK WASHER, Bearing Retainer Screw							3		29	128
17	19		10-2039	SCREW, Bearing Retainer							3		03-H	137A
17	21		10-19905	AXLE, Large Gear							1		03-H	137A
17	22		2-181	WOODRUFF KEY, Large Gear							1		03-H	137A
17	23		10-4904Z	GEAR, Large Distributor							1		03-H	137A
17	24		10-4226	LOCK, 4 Ear							1		03-H	137A
17	25		10-17184	SCREW, Large Gear							1		03-H	137A
17	26		10-12647	CARBON BRUSH, Large Gear Screw							1		03-H	137A
17	27		10-15970W	FINGER, Distributor, Anti-clw.							1		03-H	137A
17	18		AN935-8	LOCK WASHER, Finger Electrode							1		29	128
17	28		10-18378	ELECTRODE, Distributor Finger							1		03-H	137A
17	18		AN935-8	LOCK WASHER, Finger Screw							3		29	128
17	19		10-2039	SCREW, Distributor Finger							3		03-H	137A
17	29		10-19903	MAGNET, Rotating							1		03-H	137A
17	30		*7503T1337	BEARING, Ball, New Departure(10-604Z)							1		*29	137A
17	31		2-828Z	WOODRUFF KEY, Small Cam Gear							1		03-H	137A
17	32		10-17537	GEAR, Small Cam							1		03-H	137A
17	33		10-9881	RETAINER, Small Cam Gear Screw							1		03-H	137A
17	34		10-12091	WASHER, 2 Ear Lock							1		03-H	137A
17	35		10-5600	SCREW, Small Cam Gear							1		03-H	137A
17	36		10-17534Y	SLEEVE, Magnet Insulating							1		03-H	137A
17	37		10-5225	GEAR, Small Distributor							1		03-H	137A
17	38		10-17896	FLANGE, Mounting							1		03-H	137A
17	39		10-1125	PLUG, Oil Drain Hole							1		03-H	137A
17	40		10-17900Y	OIL SEAL, Drive Shaft							1		03-H	137A
17	41		10-3677	LOCK WASHER, Flange & End Plate to Housing Screw							4		03-H	137A
17	42		10-4339	SCREW, Flange & End Plate to Housing							4		03-H	137A
17	13		AN935-10	LOCK WASHER, Flange to End Plate Screw							6		29	128
17	43		10-13544	SCREW, Flange to End Plate							6		03-H	137A
17	44		10-21287	ADAPTOR, Breaker							1		03-H	137A
17	45		*7501L1144	BEARING, Ball, New Departure (10-20863)							1		*29	137A
17	46		10-19756	SHAFT, Cam							1		03-H	137A
17	45		*7501L1144	BEARING, Ball, New Departure (10-20863)							1		*29	137A
17	47		10-18464	SPACER, Cam Shaft Bearings							1		03-H	137A
17	48		10-19757	GEAR, Large Cam							1		03-H	137A
17	49		10-15738	WASHER, 4 Ear Lock							1		03-H	137A
17	50		10-15739	SCREW, Large Cam Gear							1		03-H	137A

RESTRICTED



RESTRICTED  
AN 03-5DA-14  
SECTION II—GROUP ASSEMBLY PARTS LISTS

FIG. NO.	INDEX NO.	STOCKED	GROUP Engine Accessories							UNITS PER ASSY	PROPERTY CLASSIFICATION		
			MAJOR ASSEMBLY Magneto Assembly - Type SF9LN-4								U.S. NAVY	U.S. ARMY	BRITISH
			PART NUMBER	1	2	3	4	5	6	NOMENCLATURE			
17	51		10-16581							1		03-H	137A
17	52		10-2636							2		03-H	137A
17	53		10-3659							2		03-H	137A
17	54		10-18536							2		03-H	137A
17	55		10-17544							2		03-H	137A
17	56		10-3317							1		03-H	137A
17	13		AN935-10							1		03-H	137A
17	54		10-18536							1	29		128
17	57		10-25049							1		03-H	137A
17	58		10-637							3		03-H	137A
17	41		10-3677							3		03-H	137A
17	59		10-22557							3	29		137A
17	60		10-599A							3		03-H	137A
17	61		10-17547							AsReq		03-H	137A
17	62		10-15741							1		03-H	137A
17	63		10-18247							1		03-H	137A
17	64		10-5500							1		03-H	137A
17	13		AN935-10							1		03-H	137A
17	65		10-3660							1	29		128
17	66		10-16296							1		03-H	137A
17	67		10-12593Y							1		03-H	137A
17	18		AN935-8							1		03-H	137A
17	68		10-17624							2	29		128
17	69		10-16620							2		03-H	137A
17	70		10-16297							1		03-H	137A
17	71		AN960-8							2		03-H	137A
17	18		AN935-8							2	29		128
17	68		10-17624							2	29		128
17	72		10-13623Y							2		03-H	137A
17	73		10-5038							1		03-H	137A
17	74		10-3983							2		03-H	137A
17	13		AN935-10							2		03-H	137A
17	35		10-5600							2	29		128
17	13		AN935-10							2		03-H	137A
17	75		10-13126							2	29		128
17	76		10-598							2		03-H	137A
17	13		AN935-10							1		03-H	137A
17	77		10-2684							1	29		128
17	78		10-532Z							1		03-H	137A
17	79		10-14447							1		03-H	137A
17	80		10-2976							1		03-H	137A
17	81		10-3263							1		03-H	137A
17	82		10-3768-1							1		03-H	137A
17	82		10-3768-2							AsReq		03-H	137A
17	83		10-14343W							AsReq		03-H	137A
17	84		10-2977							1		03-H	137A
17	85		10-15676							1		03-H	137A
17	86		2-194							1		03-H	137A
17	87		10-3845Y							1		03-H	137A
17	88		10-3429							1		03-H	137A
17	89		10-3424							1		03-H	137A
17	90		10-3846							1		03-H	137A
17	91		2-171Z							2		03-H	137A
17	86		2-194							2		03-H	137A
17	92		10-528Z							2		03-H	137A
17	93		10-17545							1		03-H	137A
17	56		10-3317							1		03-H	137A
17	13		AN935-10							1		03-H	137A
17	54		10-18536							1	29		128
17	94		10-15823							1		03-H	137A
17	95		10-20945							1		03-H	137A
			10-19163							1		03-H	137A
										1		03-H	137A

RESTRICTED  
AN 03-5DA-14  
SECTION II—GROUP ASSEMBLY PARTS LISTS

FIG. NO.	INDEX NO.	STOCKED	GROUP Engine Accessories							UNITS PER ASSY	PROPERTY CLASSIFICATION		
			MAJOR ASSEMBLY Magneto Assembly - Type SF9LN-4								U.S. NAVY	U.S. ARMY	BRITISH
			PART NUMBER	1	2	3	4	5	6	NOMENCLATURE			
17	96		10-12507							1		03-H	137A
17	97		10-20946							1		03-H	137A
17	98		10-20693							1		03-H	137A
17	99		10-20955							1		03-H	137A
17	100		10-18050							1		03-H	137A
17	101		10-18592Y							1		03-H	137A
17	102		AN3105-6							1		03-H	137A
17	103		10-5200							1		03-H	137A
17	104		10-4358							1		03-H	137A
17	105		AN935-8							1		29	128
17	106		10-18003							1		03-H	137A
17	107		10-17050							1		03-H	137A
17	108		10-17044							1		03-H	137A
17	109		10-17045							1		03-H	137A
17	110		10-17047							1		03-H	137A
17	111		10-17046							1		03-H	137A
17	112		10-17048							1		03-H	137A
17	113		10-17049							1		03-H	137A
17	114		10-17054							1		03-H	137A
17	115		10-22779							1		03-H	137A
17	116		10-21289							1		03-H	137A
17	117		10-21673							3		03-H	137A
17	118		AN935-10							3		29	128
17	119		10-19947							3		03-H	137A
17	120		10-17066							3		03-H	137A
17	121		10-4879U							1		03-H	137A
17	122		2-541							9		03-H	137A
17	123		10-4883							9		03-H	137A
17	124		10-20676							1		03-H	137A
17	125		2-679							1		03-H	137A
17	126		2-185							10		03-H	137A
17	127		10-14931Y							1		03-H	137A
17	128		10-21495							1		03-H	137A
17	129		10-19433							1		03-H	137A
17	130		10-19435							1		03-H	137A
17	131		10-8584Y							1		03-H	137A
17	132		10-8583							1		03-H	137A
17	133		10-21279							1		03-H	137A
17	134		10-21280							1		03-H	137A
17	135		AN935-10							2		29	128
17	136		10-7121							2		03-H	137A
17	137		10-5790							2		03-H	137A
17	138		10-3677							2		03-H	137A
17	139		10-5791							2		03-H	137A
17	140		10-30813							1		03-H	137A
17	141		10-21284							1		03-H	137A
17	142		10-17380							2		03-H	137A
17	143		10-2163							2		03-H	137A
17	144		10-17381							2		03-H	137A
17	145		10-21285Y							1		03-H	137A
17	146		10-12097							1		03-H	137A
17	147		10-12362							1		03-H	137A
17	148		10-9354							1		03-H	137A
17	149		10-7441							1		03-H	137A
17	150		10-9966							1		03-H	137A
17	151		10-9292							1		03-H	137A
17	152		10-9967							1		03-H	137A
17	153		AN935-10							1		29	128

RESTRICTED

RESTRICTED  
AN 03-5DA-14

SECTION II—GROUP ASSEMBLY PARTS LISTS

FIG. NO.	INDEX NO.	STOCKED	GROUP Engine Accessories							UNITS PER ASSY	PROPERTY CLASSIFICATION		
			MAJOR ASSEMBLY Magneto Assembly - Type SF9LN-4								U.S. NAVY	U.S. ARMY	BRITISH
			PART NUMBER	1	2	3	4	5	6				
17	134		10-18516						SCREW, Ventilator	1		03-H	137A
17	135		2-281						LOCK WASHER, Cover Clamping Screw	2		03-H	137A
17	136		10-18522						SCREW, Coil Cover to Housing	2		03-H	137A
17	135		2-281						LOCK WASHER, Cover Fastening Screw	6		03-H	137A
17	137		10-8489						SCREW, Coil Cover to End Plate	6		03-H	137A
17	138		AN4084-1						COUPLING, Magneto Drive	1		03-H	137A
17	139		10-5498						WASHER, Drive Shaft Nut	1		03-H	137A
17	140		AN935-616L						LOCK WASHER, Drive Shaft Nut	1		29	128
17	141		10-948Z						NUT, Drive Shaft	1		03-H	137A
17	142		AN380C3-3						COTTER PIN, Drive Shaft Nut	1		29	128
17	143		10-21290						COVER, Air Blast	1		03-H	137A
17	13		AN935-10						LOCK WASHER, Air Blast Cover Screw	4		29	128
17	144		10-4018						SCREW, Air Blast Cover	4		03-H	137A
17	145		10-13222						LEATHER PLUG, Flange & End Plate to Housing Screw Hole	4		03-H	137A
10-21225-1      INSTALLATION - Magneto - Type SF9LN-4													
Same as Basic Magneto Assembly, Type SF9LN-4, No. 10-21225													
With No Exceptions													